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ABSTRACT

Study objectives were to: determine the range of retail goods provided by different size urban places in two predominantly different rural states (Illinois and Iowa); investigate the relationship of distance to larger urban places and the impact on retail offerings of small towns; estimate the effects of location (i.e., proximity) and town size on community viability as reflected in retail sales. Employing the central place theory and the Relative Sales Pattern Index (RSPI), the retail system of all Iowa and Illinois towns exceeding 2,500 in population for the years 1954, 1958, 1963, and 1967 was investigated in terms of 8 hypotheses derived from previous case studies. Results indicated empirical evidence of: larger urban centers playing an important role in the retail sector, especially in Illinois; growing relative importance for ubran-size classifications of 25,000 to 50,000 and 50,000 to 100,000; progressive deterioration in the range of goods being offered in Illinois small towns; correlation between location of town and retail sales when location is related to distance from both large urban centers and nearby larger towns; larger retail sales in centers of larger population and in towns of the same size located farther from nearby larger towns and/or larger urban centers; a range and relative distribution of retail sales approaching the expected sales pattern for the average consumer when a town is farther from its nearest larger neighbor and from large urban centers. (JC)

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The Effect of Town Size and Location on Retail Sales

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THE EFFECT OF TOWN SIZE AND LOCATION ON RETAIL SALES

by

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January 1976

This study was conducted in cooperation with the University of Illinois as a regional research project (Hatch Project 363).

PREFACE

This report is the result of research work initiated as a regional research project on "Community Viability, Growth and Decline," Hatch Project 363, conducted by the University of Illinois at Champaign-Urbana in cooperation with and supported by the North Central Regional Center for Rural Development, Iowa State University, Ames. This publication summarizes the initial work done using the data from the U.S. Census of Retail Trade along with size and location data for each urban location having a population of 2,500 or more in the states of Illinois and Iowa. These states were selected to give a range and contrast in presenting both the rural and lower population density part of the North Central states (Iowa) as well as an important agricultural state with a higher population density and a larger number of urban places (Illinois).

Additional research is continuing on community viability and the relationship of communities as parts of large economic systems with respect to agriculture, employment, manufacturing, public and private services as well as new analytic techniques for analysis. This continuing research will be reported as results are obtained.

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I. INTRODUCTION

The historic and continuing economic and social changes that are occurring in small urban and rural communities now are as important as farm adjustment was to technological change in the past. Yet while we have analyzed changing farm technology and its impact upon the individual farm firm and have developed agricultural policies to help farmers adjust to these changes, we have not examined in any detail, nor have we developed policies for, the concomitant changes occurring in the other sectors of rural areas--the public and private sectors of small urban places and rural communities in the nonmetropolitan or rural areas.

Small urban places initially developed to serve the farming community. These small towns were multifunctional. They brought together, and in some cases manufactured, the inputs for farming and distributed them to farmers. These rural towns also were the first link in the marketing and processing chain for the farm products produced in their service region. In addition to these important economic functions performed in the agricultural production and marketing process, rural places furnished the consumption items for farm families and those living in rural areas. They also performed the social and service functions needed by the surrounding open-country population as well as by their own population.

The changing technology in farming, transportation, and communication has had and continues to place varying kinds of pressure on rural

communities for change. The declining need for manpower on farms along with improved transportation, which allows farmers to go farther to get their consumption and service needs and farm inputs and to market their farm products, have had profound effects on rural communities. Changes have also occurred in scale efficiencies in retailing, manufacturing, and the service industries--both those offered by private companies and those of public services, such as education, road maintenance, and health care.

Migration occurred from rural areas because the birth rate in rural families rose above that needed for population maintenance and because the amount of labor required in agriculture declined. When this out-migration occurred from the countryside, many rural towns were unable to keep their population because no new jobs or alternative employment opportunities were developed. Most of this population flowed on to the larger urban areas where manufacturing and businesses were expanding and offering new jobs. This change, along with improved transportation and roads, reduced the role that small urban towns had played in the consumption and service areas normally related to population size. An improved transportation and communication infrastructure linking rural areas to large urban centers allows the small town and rural resident to travel farther, faster, and more conveniently to obtain the necessary items for production, to market their products, and to purchase personal and family consumption items. This increases the competition between the larger, more distant centers of economic activity and the small towns in the rural area and hinterland (9). Adding further dilemma to the economic viability

of the small town is the fact that most industrial development in the total economy has occurred mainly in the major metropolitan centers with the result that local community and area job opportunities are further lessened [1].

So many agricultural inputs and consumption items that were once made and repaired in the rural community are now manufactured in urban industrial centers. The point is not that these technological changes have not added to the efficiency and material well-being of society, because we have an economy which has reduced labor drudgery and labor input in almost all goods, making available to all the greatest food and material wealth of any society. The point is that for improved living conditions both in rural areas and metropolitan centers, development of greater alternative employment opportunities in rural areas resulting in a more even distribution of population between metropolitan and rural areas would have been desirable.

A report by the President's National Advisory Commission on Rural Poverty in September, 1967, observed:

> Developments in transportation and communications systems along with the expanded network of roads and highways have confronted many villages with competition from larger towns and cities. The result has been extension of the trade areas of the larger towns and cities into areas once served by villages. The same developments have made it possible for rural people to commute farther to jobs in towns and cities. Moreover, modern transportation and communications systems have made it possible for industry to decentralize somewhat. Manufacturing and trade are moving from the central cities of larger SMSA's, to the suburbs, to smaller SMSA's and their suburbs, and to counties adjacent to SMSA's. Manufacturing continues to grow rapidly in the larger towns also. . . .[16].

These causes and innumerable other economic and sociological factors seem to indicate a changing spatial distribution of economic activities. These changes may be a source of bewilderment and frustration for the small urban and rural resident. Flood and Schreiner wrote in their study of South Central Oklahoma:

> All too frequently the agricultural segment, which by far has sustained the greatest structural change of any rural group, is puzzled by the changes that are occurring in the retail, business, and public service sectors of the nonagricultural rural economy. Many goods and services which were previously available in the local trade center are no longer available in that center but must be purchased at a larger more distant center. Some centers will grow faster than others with no apparent differences in the activities composing their economic base. Others will change dramatically because their economic base will expand due to new manufacturing or recreational activities [16].

To continue in existence, every community must have some economic or other functional contribution to make to the total socioeconomic functions of society. Declining economic bases, whether the agricultural trade area, mineral, manufacturing, transport, or retail and consumption services, of many rural and small urban communities have altered the reasons for continued economic viability.

The tertiary production and retailing of goods and services of many communities occupy an important position in the framework of economic activity. This economic sector of the local economy has experienced both absolute and relative growth and decline in past years depending on the general economy, its own economic base, its regional economy, and its

relationship to its trading area, nearby small urban neighbors, and the closest large urban center. The technological and social changes already mentioned, as well as any regional changes with respect to these nearby small communities, growth centers, and metropolitan cities, have created a milieu of economic and social pressures affecting the socioeconomic functioning of small urban and rural centers.

In previous eras the smallest central place was considered to be the small town which provided its citizenry and its hinterland with convenience goods through the local grocery store, drugstore, barber shop, or filling station. Time and change have brought about a retail sector in which a much larger volume of goods and services are necessary to operate and develop an establishment capable of meeting the economic demands of survival. Supermarkets have supplanted the local general store, and large medical clinics have largely replaced the general practitioner.

Table 1 is a summary of retail trade for Illinois and Iowa for the years 1954, 1958, 1963, and 1967. It is evident that the retail sales pattern for these states has changed over time. Many categories of retail trade have experienced large gains from one data year to the next, some have undergone relatively small gains while others have declined in total sales.

From the aggregate state totals, one cannot determine the changes that have been prominent in the retail trade pattern of urban and rural communities of different population size and location. To acquire a more comprehensive understanding of the fluctuations in the retail trade

Table 1. State retail sales in total and by sales category[a]

Sales Categories	1954	1958	Percent Change 1954-1958	1963	Percent Change 1958-1963	1967	Percent Change 1963-1967	Percent Change 1954-1967
				Illinois				
1. Lumber, Building Materials, Hardware, Farm Machinery	814	901	10	877	- 2	1,148	30	41
2. General Merchandise	1,108	1,306	17	1,831	0.1	2,657	45	139
3. Food Store	2,414	2,929	21	3,305	12	4,025	21	66
4. Auto Dealers	1,805	1,802	- 0.1	2,626	45	3,205	22	77
5. Gasoline Stations	605	832	37	963	15	1,261	30	108
6. Apparel, Accessories	754	842	11	891	5	1,159	30	53
7. Furniture Stores	518	620	19	597	- 3	916	53	76
8. Eating, Drinking Places	1,013	1,097	8	1,249	4	1,592	11	57
9. Drug Stores, Proprietary Stores	333	432	29	560	29	741	32	122
10. Other Retail Stores	977	1,176	20	1,223	3	1,560	27	59
11. Nonstore Retailers	678	854	25	1,068	25	988	- 7	45
Total Sales	11,017	12,790	13	15,190	18	19,252	26	42
				Iowa				
1. Lumber, Building Materials, Hardware, Farm Machinery	477	509	6	488	- 4	645	32	39
2. General Merchandise	267	294	10	366	24	527	44	97
3. Food Store	587	706	20	787	12	932	18	98
4. Auto Dealers	547	546	- 0.002	674	23	816	21	49
5. Gasoline Stations	222	272	22	324	19	392	21	76
6. Apparel, Accessories	144	172	19	169	- 1	192	13	33
7. Furniture Stores	144	150	4	145	- 4	196	35	36
8. Eating, Drinking Places	188	203	7	224	10	301	35	60
9. Drug Stores, Proprietary Stores	83	99	19	114	15	150	32	80
10. Other Retail Stores	377	376	- 0.003	532	42	782	47	207
11. Nonstore Retailers	44	39	-11	65	64	85	31	93
Total Sales	3,078	3,367	9	3,888	15	5,017	29	62

SOURCE: Adapted from [23, 24, 25, 26].

[a]Sales are given in millions of dollars.

categories, the shifts that have taken place in the individual municipalities of each state need to be analyzed. Consideration of these changes should enable us to both measure and analyze the effects of population, distance, and regional composition on the gross volume of retail trade and difference in the proportions of various categories to the gross trade volume.

Objectives of the Study

The general objective of this study is to compile and report the history of growth and decline of retail trade and its composition in the small urban and rural areas of Illinois and Iowa. The time periods considered are the years 1954, 1958, 1963, and 1967. These are the years of the Census of Retail Trade, with 1967 being the last year available. Specific objectives of the study are:

1. To collect and collate the retail sales data with size and location of town relative to other small urban places, major economic centers, and outlying growth centers.
2. To show the sales pattern or the composition of products of the individual incorporated place as compared with the sales pattern for the region or states.
3. To compare the per capita sales distribution of incorporated places of different size with the per capita sales distribution for the region or states.
4. To develop further hypotheses or identify additional variables that may eventually be used to predict community viability,

function, growth, and decline within the context of the economic system where the community is located.

With these objectives in mind, we suggest the following hypotheses:

1. Towns that are located within the shadow of an urban center probably will have experienced declining total retail sales relative to towns beyond the influence of the urban center.
2. As the distance from an urban center increases, the population of an individual town will become less important in affecting retail sales. (Within the context of this research effort, an urban center will be defined as any city which exceeds 50,000 persons in the given year.)
3. Greater distance from an urban center will have more effect on towns with less than 10,000 persons.
4. Towns experiencing the "shadow effect" of urban centers probably will have experienced greater decline in retail sales in the consumer maintenance categories.
5. As the size of an urban center increases, the distribution of retail sales among categories will approach the overall regional or state distribution pattern.
6. Towns of less than 5,000 persons will have a greater than proportional share (relative to population) of the retail market for certain retail categories.
7. Some service-related categories will have virtually no sales in smaller urban centers.

8. Although small towns as a whole do not provide a substantial retail offering, many small communitites are on a par with their larger urban neighbors in the composition of retail goods.

Review of Previous Research

In recent years some research studies have been conducted in an attempt to analyze the changing distributional patterns of retail trade. These studies have taken several forms: some studies have focused on the relative changes in the retail and commercial sector following the location of an industrial plant in a rural-agricultural area; some have studied the changes that have occurred in the retail, business, and public service sectors of the nonagricultural rural economy by classifying the trade centers according to their distance from a larger trade center; and some have developed indexes that can be used to rank trade centers according to their service availabilities.

A study by Flood and Schreiner employed central place theory to analyze the availability of retail and business services to rural populations in South Central Oklahoma [6, p. 164]. In applying central place theory to their data, they sought to obtain support for the hypothesis that in general the order (complexity and size) of a trade center is related to the distance from a higher-order trade center. An analytical procedure was developed to study the locational demand and supply of goods and services. Their analysis attempted to determine (1) if there existed a clear differentiation of towns based on the range of goods and services

provided and (2) if such a differentiation did exist, what relation it had to distance from larger towns.

This study concentrated on the establishments in towns of less than 5,000 population. Towns were then ordered according to the total number of establishments and the presence or absence of a particular group of goods and services.

Flood and Schreiner made two additional classifications in their study: (1) a population threshold level was established by activity and (2) the distance from the nearest town over 5,000 in population was used to study the location of retail activities relative to the location of larger towns. They were unable to conclude from the results of their study that proximity to larger urban centers does impose constraints on the potential service functions of a small trade center.

Leyes and Miller also used the Theory of Central Places in their research [10]. However, their analytical techniques differed substantially from that of Flood and Schreiner. Leyes and Miller used a mathematical approach to delineating their hierarchical system of cities. For instance, at different stages of development of their research study they found combinatorial programming, factor analysis, and a heuristic programming algorithm to be useful techniques.

The development of an index of centrality, which was based on a proportional weight for each type of business in each community, was a basic part of their work. This centrality index was then used to develop a hierarchical system.

The Leyes and Miller work also differed in that they did not rely upon the populations of the communities in developing their hierarchical systems. Leyes and Miller thought the omission of population improved the quality of the results from the viewpoint of central place theory, since population could reflect the internal influence of economic activity other than central place functions [10, p. 26].

Simmons did a study, in which the data gathered under the direction of the Community Renewal Program of the City of Chicago, to examine the changing patterns of retail location [18]. This study sought to describe and explain the changing pattern of retail location within the city.

Simmons' analyses indicated that the pressures of increasing standards of living, technological change, and urban growth are affecting the retail structure in two ways. First, the amount and type of retail facilities required to serve a given population are changing. Average store size has doubled which, coupled with the dispersion to the suburbs of population and income, has led to a decline in the number of stores in the central areas of cities. Second, the grouping and location of shopping areas has been altered [18, p. 9].

Simmons stated that, "The specialization of areas within the urban region is really a change in the order or level of specialization comparable to shift of competition from between stores to between centers in the case of retailing" [18, p. 153]. Particular centers will no longer provide all things--retailing, employment, and services for their hinterland. This is similar to the sharing of functions by small towns.

Brush and Gauthier, in a study of Middle and Lower Bucks County, Pennsylvania, and Burlington and Glouchester Counties, New Jersey, sought to analyze and describe the basic spatial patterns of service centers and consumer interactions [4]. The objectives of their analysis were stated in the following series of questions:

1. In what manner were the existing service centers created?
2. What, if any, are the functional grades and spatial patterns of centers?
3. Are consumer service areas identifiable and, if so, how are centers and areas related [4, p. 15]?

They found that service centers and service areas on the metropolitan fringe were identifiable, both in a hierarchical spatial pattern of establishments and in terms of service areas based on consumer travel. They were able to establish a functional grade, or order, for the centers and to identify the centers' associated service areas. Only in working with the lower-order centers did they have difficulty in distinguishing the service area.

However, from the results of their analysis, Brush and Gauthier were able to say that, in many cases, the lower-order centers were evidently dominated by the influence of adjacent higher-order centers and lie within their service area.

Brush and Gauthier found in their analysis of service centers that certain business types, especially filling stations, food stores, and personal or repair services, were more closely related to the distribution

of population than other business types, such as auto sales and shopping goods. From this one could infer that the goods and services provided by establishments of the first three types are those demanded most frequently and for which people expect to travel short distances. The last two types of establishments are those to which people are willing to travel greater distances [4, p. 89]. Also, those categories of sales that have lower per capita sales and less frequency of sales must be sold in stores that have a higher population threshold in order to maintain the volume of business necessary to continue an economically profitable business operation.

Further evidence of the fluctuating nature of retail trade is provided by Summers, Hough, Scott, and Folse [21]. Their study was developed to capture the processes and consequences of sudden industrialization in an area that had been predominately dependent upon agriculture and related industry. The initial findings of the study indicated (1) a trend to fewer but larger establishments in the trade and commercial sector as well as in agriculture and (2) that establishment of new retail outlets was following the movement of population to the less-industrial counties--however, the volume of sales remained concentrated in the established retail and trade centers. This, as the authors stated, "resembles the inner-city to suburban movement of retail outlets in more urbanized areas" [21, p. 53].

The recent trends in the movements of retail trade were the subject of "The Suburbanization of Retail Trade" [20]. This research effort

examined the changing distribution of retail sales and outlets between the central cities and their associated suburbs. In particular, the report focused on changes in 28 metropolitan areas of the United States. The major finding of this study was that the downtown of the big city has given way to the shopping centers of the suburbs.

A study by Rogers outlined a statistical procedure for analyzing the spatial clustering of retail establishments in urban areas [17]. He concluded that competing shopping-goods establishments tend to cluster together in order to share in the increased volume of sales that such aggregation produces. Results of the analysis also revealed that convenience-goods establishments also tend to exhibit a highly clustered pattern. This spatial clustering was attributed to the spatial distribution of population. Convenience-goods stores tend to be drawn toward the consumers they serve because of the unspecialized and recurrent function that they perform. Thus, they tend to assume a distributional pattern that mirrors that of the residential population.

Berry and Pred's work gives an overview of the empirical findings of applied central place studies [2]. Their critique shows that empirical central place studies provide ample evidence that a continuum of central places exists. Further, the empirical findings reveal that each order of central place has a given size of trade area measured in terms of total demand and lower-order centers [2, pp. 6-7].

In relation to retail trade, Berry and Pred made the following observations:

> Differences in conditions of entry and available economics of scale, with implications for required numbers of customers, apparently represent the businessmen's motives for hierarchical order. Pressures for a hierarchy on the consumer's part may be found in the differential periodic occurrence of shopping needs--day-to-day, weekly, and so on. Immediate convenience buying, comparative shopping, telephone call for home service, and mail-order, all influence business locations in different ways. Similarly, so do single-purposes and multiple-purpose shopping trips, type of transport available, etc. [2, pp. 9-10].

Fox has defined "functional economic areas" as a geographic area in which almost all the labor present in the area is sold within it, and almost all the goods consumed in the area are purchased within it [7, p. 59]. In order to develop functional economic areas for Iowa, Fox examined community data for evidence of the existence of labor market areas of such size that a huge percentage of home-to-work trips could be accomplished in less than an hour's automobile time each way. This was based on the assumption that two hours a day is about the maximum that commuting workers are willing to spend traveling between place of residence and work. Fox suggests that if centralizing tendencies are present, each labor market area should be organized around a central city that provides the largest and most diversified array of jobs in the area.

According to Fox, the other locations of daily importance to people are for the most part closer to home than is the place of work--the gasoline station, the school, the church, the bank, the food store, the motion picture theater, and the hardware store.

Fox defined several kinds of trade and service centers which appeared to form a hierarchy of functional significance [7, p. 59]. Fox defined his centers as either full convenience centers, partial shopping centers, complete shopping centers, or the central city itself. Classifications were based on the availability of goods and services to the consuming public.

Barchert and Adams developed a hierarchy of places based upon the availability of specified ranges of retail and wholesale activiites, supplemented by minimum dollar volume of retail and(or) wholesale trade [3]. They classified their places as either minimum convenience, full convenience, partial shopping, complete shopping, secondary wholesale retail, or primary wholesale retail centers. The classification framework is developed using ranges for the number and types of businesses which must fall in each class for a place to fall in a particular class within the hierarchy.

Hodge's study addressed the analytical problem of distinguishing the prospects for growth or decline of trade centers in the Province of Saskatchewan in the Northern Great Plains [8].

Hodge first sought to determine whether trade centers experienced growth or decline. Instead of using population change as a measure of viability, Hodge utilized actual changes in the retail service level. He suggested that this measure has the advantage of being a direct reflection on the meaning of a trade center--it measures the trade center's ability to attract patrons for its business establishments [8, p. 89]. Hodge classified centers according to the availability of specialized goods and services.

Hodge suggests that the key relationships governing trade center change are more complex than those of population size, retail service level, or location. He utilized such variables as history of sustained population growth, good access to rail and highway transportation, a high level of community services, presence of a high school and hospital, a high ratio of nonagricultural employment, and a high level of education among the local residents as indicators of improved chances of community survival. Hodge utilized an inductive model to explore the notion that trade center growth or decline is related to differences in community environment. Factor analysis was employed to determine which variables were associated with each other. The resultant clusters of variables (factors) were treated as independent variables describing trade center environment in a multiple regression model in which the dependent variable was the change in number of retail firms [8, p. 90].

Finally, gravity models have been used to indicate the different-sized market and supply areas of varying sized cities and towns. William J. Reilly, in one of his early studies of spatial trading patterns, made an attempt to induce an empirical formula to explain retail trading areas of cities in terms of their size. "Reilly's Law of Retail Gravitation" says that "two cities attract retail trade from any intermediate city or town in the vicinity of the breaking point (between their spheres of dominance), approximately in direct proportion to the populations of the two cities and in inverse proportion to the squares of the distance from these two cities to the intermediate town" [9, p. 131].

The research effort we are presenting here differs from the foregoing research cited in that the retail system under observation is expanded to contain a larger number of cities. All urban places in Illinois and Iowa that exceeded 2,500 persons in the data years are included. However, this study contains many similarities to the above references in that we have delineated urban places by size and distance, and that an index of centrality is computed to aid in the hierarchical ordering of places. Therefore, we are trying to determine whether previous findings for selected geographic locations can be generalized more to whole states and regions, and we also are trying to develop a more adequate measure of centrality that will be useful in measuring other aspects of function, growth, and decline.

Theory and Method

To study the economic impact of the location of economic activities in small communities, economic theories that can handle the "economics of small areas" need to be used [1, p. 32]. An incomplete list of available theories and methods includes central place theory, income concentration, transportation theory, international trade theory, equilibrium models, interregional competition, interregional multipliers, economic base studies, input-output studies, and activity analysis. Metropolitan dominance theory, borrowed from sociology, could also be used to explain the dominating influence of central places on the smaller cities within their sphere of influence.

> Spatial economics deals with what is where, and why. The 'what' refers to every type of economic activity: not only production establishments in the narrow sense of factories, farms and mines, but also other kinds of businesses, households, and public and private institutions. 'Where' refers basically to location in relation to other economic activity (i.e., to questions of proximity, concentration, dispersion, and similarity or disparity of spatial patterns). The 'why' refers to explanations within the somewhat elastic limits of the economist's competence [19, p. 2].

Since in varying degrees, small urban and rural areas are not functional parts of larger economic communities with a dominant town or city as a center, elements of spatial economics may be used in analyzing the distributional patterns of their economic activities. An economic study of this type would purportedly explain the relationship between the volume and distribution of economic activities in the small towns and cities as related to their size and location relative to the size and locations of nearby larger centers of economic activity.

Since this research effort draws heavily on the elements of central place theory in an attempt to describe retail service availability by center size, a brief outline of this theoretical concept follows.

Central place theory

"Central place theory attempts to explain the location, size, nature, and spacing of economic activity" [6, p. 164]. This body of theory has been used to explain the availability of goods and services in towns of different sizes. A hierarchy or ranking of centers may be developed by considering their relative importance within the system.

Marshall used the following criteria to establish his concept of central place hierarchies [12, p. 7]. First, the urban places should be arranged in tiers such that each member of every tier except the highest is subordinate to at least one member of some higher tier. Second, the functions performed by higher tiers also include the functions performed by all lower tiers. Third, the variations between the members of a given tier are less than the variations between tiers. And last, the members of all tiers form a complete system.

In central place theory, higher-order centers are said to be more complex. That is, these higher-order places offer a greater range of consumer goods and services, have more retail establishments, and serve a larger area than lower-order centers. Likewise, lower-order centers supply a smaller range of consumer goods and services to a smaller area. Lower-order centers tend to supply goods and services, such as food and gasoline, which require frequent purchasing by all or nearly all individuals.

Marshall began his discussion of Christaller's theory of hierarchical structuring with the location economist's traditional assumption, an isotropic plain. On this uniform surface, a farming population was assumed to be distributed at a constant density and disposable family income was assumed to be evenly distributed. Also, movement was held to be equally unrestricted in all directions from all points, with transportation costs being directly proportional to distance traveled [12, p. 12].

An additional assumption was that the economy was one of perfect competition in all markets. Therefore, individual purchases were too

small to affect the price of any commodity and there must be no opportunity for collusion among suppliers. Marshall wrote, "in contrast to the non-spatial classical theory of perfect competition, Christaller's argument explicitly recognizes that location effects the competitive positions of each supplier. Since each location is unique, each supplier is topologically a monopolist, rather than a perfect competitor " [12, p. 12]. Therefore, Marshall suggests that "Christaller's theory should be regarded as one in which the basic assumption of perfect competition is modified by explicit consideration of the factor of location" [12, p. 12]. We may now turn to an explicit consideration of the locational demand and supply of retail goods and services.

The location demand for retail goods and services

An illustrative demand curve, DnDn, is drawn in Figure 1 [15, p. 18]. In this representation the curve is assumed to be linear. The line, DnDn, traces the quantity demanded per consumer per unit of time for alternative prices. If the price was OP, the consumer would purchase OQ units per unit of time. Understandably, for higher prices a smaller quanity would be demanded. Likewise, for prices lower than OP, a larger quantity would be demanded.

Since the consumer pays not only the purchase price of a good but also a transportation cost proportional to the distance traveled to and from the central market, the effective price of the good increases with distance from the market. If OP were the market price of a good and the consumer was adjacent to the retailer, he would purchase OQ units per

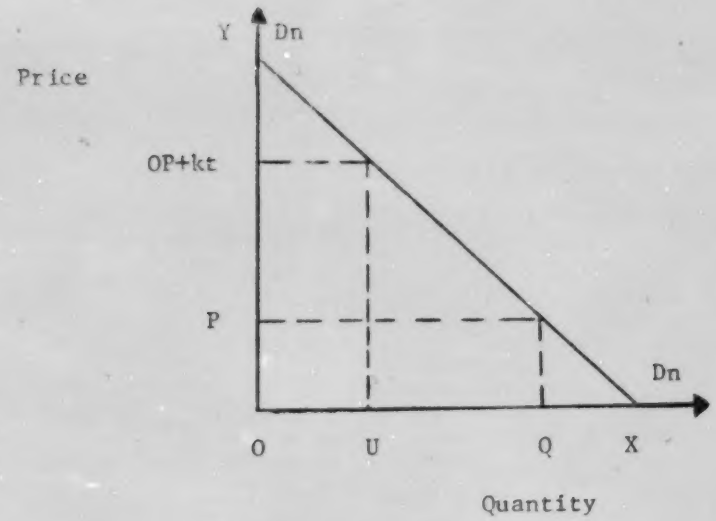

Figure 1. Demand curve.

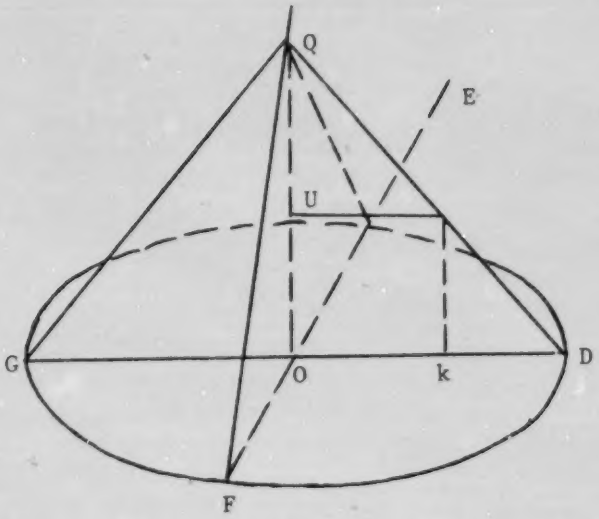

Figure 2. Demand cone.

unit of time. However, if the consumer lived k miles from the central market and the cost of transportation was t per unit per mile, the consumer's effective purchasing price would be OP + kt. The quantity demanded would then become OU.

"In spatial terms, this means that the quantity demanded declines as distance from the supplier increases [12, p. 13]. Eventually a distance will be reached where the consumer demand for the good becomes essentially zero. This distance from the market center is defined as the range of the good.

The total quantity demanded from a retailer for any price can be illustrated by the demand cone in Figure 2 [15, pp. 20-22]. OQ represents the quantity of a good that is demanded by a consumer adjacent to the central place. Consumers k miles from the central market would, for instance, demand OU units per unit of time. The height of the cone at any point shows the quantity demanded at that location. Assuming constant consumer density, the total quantity demanded is the volume of the cone times the consumer density. This cone is derived from the demand function in Figure 1. The vertical distances to the cone surface represent the quantities demanded by consumers located at varying distances from the center of the cone where the goods are sold at a given price. The quantity OQ is the quantity demanded at a given price, P, by a consumer located at the center with no distance to travel. All other consumers have to pay a higher effective price, P + kt, depending on their distance from the center. The underlying assumptions in this analysis are that the demand function is linear, that cost of travel

increases and is directly proportional with distance, and that consumers are evenly distributed over the landscape in all directions from the retail center.

Each price results in a different demand cone. For instance, if the price were greater than OP in Figure 1, the height and base of the cone become smaller and the volume decreases. Thus, an increase in price results in a decrease in quantity demanded at every location.

Locational supply of goods and services

A retailer would be unable to stay in business unless his establishment sells a certain minimum volume of goods. If volume and return per unit drops below this critical level, the retailer would be unable to meet all costs. This minimum volume for a good and the associated number of customers for that good is termed the good's threshold. In Figure 3, OA represents the minimum range within which the threshold level for the good falls, and OB represents the range of the good. AB in the illustration would then indicate "excess profits" for the establishment [6, p. 167]. OA then is the volume level needed where marginal cost is equal to marginal revenue in a micro-theory context, with any additional volume sold (AB) resulting in profit.

Suppose, now, that as many suppliers as possible locate on the plain. "Since each supplier has a circular market area, the problem may be visualized as that of packing circular plates on a table so that their centers are as close to one another as possible" [12, p. 14]. The "A_1" centers

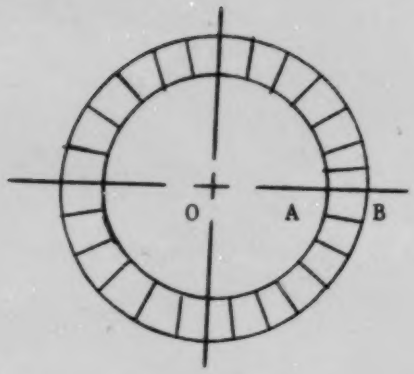

Figure 3. Range of a good.

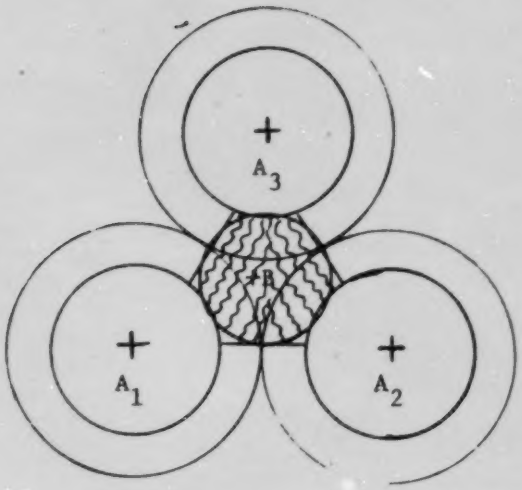

Figure 4. Hierarchy of central places.

in Figure 4 represent this arrangement. The size of the market area will be minimized in this arrangement. In other words, the range of the good will be at its lower limit as specified by its volume and population threshold level for the good when the possibility of "excess profits" is eliminated.

Of course, there are many types of retail goods, and each good may have a different threshold level. Gasoline, for instance, may have a lower threshold than jewelry, and jewelry may have a lower threshold than a cultural attraction, such as symphony hall. Figure 4 also represents the different threshold demands for a retail good to be offered in a particular market. Assume that some good, say good Z, is the highest-order good. Good Z will be offered for sale in the "A" centers. Suppliers of good Z will not earn "excess profits" above those traditionally assumed by economic theory. Now, take the next lower-order good, say good Z-1. The retailers offering this good for sale by locating in center "A" would realize "excess profits." The retailer of good Z-1 would reap the benefits of the larger trade area (which exists for good Z but has a lower threshold level).

As we descend the hierarchical ladder of retail goods, a good, say good Z-p, will eventually be reached for which "the interstitial buying power" will be large enough to influence the establishment of retail outlets in the "interstices" between the "A" centers [12, p. 16]. This second set of centers, the "B" centers shown in Figure 4, will be located at the center of the triangle formed by three adjacent "A" centers.

Understandably, merchants of the "B" centers cannot offer for sale any good with a threshold level higher than Z-p. However, they can supply goods which have a lower threshold level.

The same logic that has lead to the establishment of the "B" centers can also justify the establishment of still lower-order centers as we move down the hierarchy of goods. With the emergence of lower-order centers comes the knowledge that closeness to larger, more complex centers constrains the potential development of smaller places within the system. Thus, a clear differentiation among the tiers of the hierarchy can be seen on this theoretical homogeneous plain. However, to fully explain the existence of small centers in terms of threshold, it is necessary to go to a multigood retail outlet.

Retailers rarely deal in one good. They, in general, provide the consuming public with a wide array of goods and services. This, according to Marshall, "implies that the 'good' of traditional theory may be thought of as a 'package deal,' which the relevant entrepreneur habitually considers as a unit when working out his balance sheet or when making a location decision," [12, p. 42].

The individual goods supplied by a multiple-good retail firm, in all likelihood, will have variable ranges. Marshall writes, "conceivably, therefore, identical multiple-good firms could locate an isotropic plain at such a distance from one another that they 'lose on the roundabouts and gain on the swings'" [12, p. 42]. This implies that establishments are farther apart than they need to be in order to profit from the sale

of goods having low ranges but are too close to profit from the sale of goods having high ranges. Marshall suggests that the distance between multiple-good establishments tends to be determined by the highest ranking goods they sell [12, p. 42].

Alternative central place arrangements

Marshall indicates that the circular central place arrangement may be redrawn in a less cluttered form by circumscribing each circle with its associated hexagon. The use of hexagons can be justified by postulating that no area on the plain is either unserved or served by two establishments. Market areas can, therefore, be either hexagons, squares, or equilateral triangles, since these are the only space-filling polygons having radial symmetry [12, pp. 18-19; 11, pp. 101-137]. The introduction of space-filling forms implies that excess profits can no longer be earned by the suppliers of marginal goods because interstitial patrons are no longer available [12, p. 19].

In reality, these exact central place structures will not exist. Transport routes linking centers together and geographic disparities, such as rivers and sharp topographic features, influence alternative developments. An uneven population distribution also causes the central place hierarchical structure to deviate from the theoretical model.

The index of centrality

Marshall states, ". . . the centrality of a town is a measure of the extent to which it is a central place." He further adds that ". . . centrality is usually expressed in terms of the variety of goods offered

for sale" [12, p. 7]. Greater centrality is associated with a greater variety of goods offered for sale.

Following Marshall and others, several have used indexes of centrality based on the number of different kinds of goods and services that are available or the number of different kinds of business establishments that exist in a town. These kinds of indexes have been helpful in establishing hierarchical relationships.

We believe, however, that along with the variety of retail goods offered in a town, the actual volume of sales of the various goods in relation to the expected volume is more useful in developing an index of centrality as well as indicating specialization of a place in retail sales. The expected volume in various retail sales categories should correspond to the relative volume of purchases in each category by an average consumer, if a place is providing the range and volume of goods needed by customers and if they do not buy from other retail centers. For the purposes of this study, it is assumed that the proportions of various sales categories to total sales for the state represent the category proportions purchased by the average consumer.

Therefore, the Sales Pattern Index used in this research was developed using proportion of sales in the various retail sales categories and then scaled to give an index with a possible range 0 to 100 as follows:

$$50 * \sum_{i=1}^{11} \left(\left| P_{ij} - P_i \right| \right) = R_i; \quad 0 \leq R_i \leq 100$$

where $P_{ij} = \frac{r_{ij}}{\sum_{i=1}^{11} r_{ij}}$ = the proportion of a particular category of retail sales to the total retail sales in each urban place;

$P_i = \frac{\sum_{j=i}^{m} r_{ij}}{\sum\sum_{i\,j} r_{ij}}$ = the proportion that the total of a category for the state is to total retail sales of the state;

r_{ij} = the retail sales in the i-th category in the j-th town;

$\sum_{i=1}^{11} r_{ij}$ = total sales for the j-th town;

$\sum_{j=1}^{m} r_{ij}$ = total sales in a sales category for the state;

$\sum\sum_{ij} r_{ij}$ = total sales of all categories and all towns;

$i = 1, 2, 3, \ldots, 11$; categories of retail sales;

$j = 1, 2, 3, \ldots, m$; the j-th town.

This index exhibits the property that when $R_i = 0$, the sales pattern of an urban place (relative to the state sales pattern) is the same as the state sales pattern. As the index increases, or approaches 100, the sales pattern of a particular town or incorporated place deviates more and more from the pattern of sales for the state as a whole.

Drastic deviations from the state norm may, in some cases, indicate that some urban places have developed a highly specialized retail service sector. In other instances, such deviations may suggest the incorporated place has an inadequate range of retail goods available for consumers of that town and its environs.

If sales patterns are consistent for towns in the same size category, we might hypothesize how sales patterns develop and what sales patterns might be expected for various types of towns as they develop.

A per capita sales quotient is defined as the per capita sales of an individual town divided by the per capita sales of the state. Use of the Sales Pattern Index along with the per capita sales quotient of an incorporated area would indicate whether a town is specializing its sales and serving a larger consumer area, or whether it is relatively declining with a shrinking availability of retail goods. The current dollar value of retail sales in a town might be increasing but sales may be relatively declining in that town if the cost-of-living index is increasing faster than the growth in dollar sales or if sales in towns around it are growing faster. Thus we refer to towns that are declining in sales as those whose current dollar sales are declining over time and to towns as relatively declining when their sales are falling relative to the cost-of-living index or are falling relative to surrounding places.

The Sales Pattern Index could be compared over time for any one place to determine how the sales pattern changes with other changes occurring in or influencing that town. Incorporated places could, in fact, be classified according to the relative position and direction of change of their sales patterns as measured by their Sales Pattern Index.

A Sales Pattern Index was computed for each town or city in this study. This index serves as a method of comparison of individual cities. By considering this index, the retail availabilities of any one urban

place can be compared to the retail offerings of other urban places, both within the same size category as well as between categories and with surrounding towns. Like retail sales, this index was also stratified into urban size categories. These categories are studied to help determine if the preselected urban-size class ranking of cities does, indeed, represent a hierarchical stratum of central places.

The distribution of retail establishments also is examined by calculating the average number of establishments, by sales category, for each urban-size class. Accordingly, the proportion of retail establishments for each urban class is also computed. Direct comparisons are made between the proportion of sales and the proportion of establishments in each category.

II. ANALYSIS OF RETAIL SALES DISTRIBUTION IN ILLINOIS AND IOWA

The Retail System

Typically, central place studies concentrate on the retail and service structures of rural or urban places that are located in a limited geographic area. For instance, a single county or a group of contiguous counties would serve as the unit of analysis. Other studies limit the geographic unit of analysis to the study of the retail and service structure of a single city or metropolitan area.

In this effort we attempt to identify larger patterns of retail structure and to test hypotheses that will have more general use, focusing on the states of Illinois and Iowa as the geographic areas of interest. The retail system analyzed is comprised of those towns that exceeded 2,500 in population for the data years 1954, 1958, 1963, and 1967.

Following development of the objectives given in Section I, our primary concern is to describe the changes that have occurred in the retail structure and the resulting shifts in retail trade distribution. The first factors considered were state total retail sales and state per capita retail sales, by sales category. These particular items show the aggregate shifts that have occurred in retail trade at the state levels.

Retail Trade Variables

Retail trade in this study includes all establishments that are engaged in selling merchandise to individuals, households, and farms.

Conceptually, the retail trade variables to be analyzed will include the following 12 categories: Gross Sales (all establishments); Lumber, Building Materials, Hardware, Farm Equipment Dealers; General Merchandise Group Stores; Food Stores; Automotive Dealers; Gasoline Service Stations; Apparel-Accessory Stores; Furniture, Home Furnishings, Equipment Stores; Eating, Drinking Places; Drug Stores, Proprietory Stores; Other Retail Stores; and Nonstore Retailers [17, 18, 19, 20].

Some categories of this listing do, in fact, contain several different types of establishments. Therefore, an understanding of the specific types of establishments contained within the general categories is needed to draw conclusions about the retail structure of Midwest towns and cities.

Lumber, Building Materials, Hardware, and Farm Equipment Dealers include among their business types plumbing, paint, electrical, and heating firms as well as hardware stores, lumber and building materials dealers, and farm equipment dealers. General Merchandise Group Stores include department stores, variety stores, and miscellaneous general merchandise stores. Grocery stores, meat markets, fruit markets, and candy stores are a few of the basic business types listed as Food Stores. Clothing and shoe stores are considered to be in the Apparel and Accessory category. The Furniture and Home Furnishings category consists of television, radio, household appliances, and music stores, as well as furniture and home furnishing stores.

Liquor stores, antique stores, book stores, sporting goods stores, fuel and ice dealers, jewelry stores, and farm and garden supply stores (including feed stores) comprise the Other Retail Stores category. Non-store Retailers are considered to be mail-order firms, vending-machine operators, and house-to-house sales persons. Eating and Drinking Places, Drug and Proprietory Stores, Gasoline Service Stations, and Automotive Dealers are self-explanatory.

Population

Population data were obtained for all towns in the study from the U.S. Census of Population, years 1950, 1960, and 1970 [26, 27, 28]. A linear interpolation of the population data between population census years was used to obtain town population size for the years in which the Census of Business was taken. This method of obtaining town size can only be approximate because of the fluctuation in population that an individual community may undergo from year to year. However, a linear interpolation will yield the direction of change and a reliable indication of the magnitude of change in population considered over longer time intervals. Also, since no other more reliable statistics are available, this method was deemed necessary for our purposes.

State Totals and Per Capita Retail Sales by Sales Category

Table 1, in Section I and Table 2, here, reflect aggregate changes in consumer purchases of retail goods. Clearly, as Table 1 shows the sale of retail goods expanded appreciably between 1954 and 1967. The

Table 2. State per capita retail sales by sales category.

Sales Categories	1954	1958	Percent Change 1954-1958	1963	Percent Change 1958-1963	1967	Percent Change 1963-1967	Percent Change 1954-1967
					Illinois			
1. Lumber, Building Materials, Hardware, Farm Machinery	77	75	-2.5	64	-14.6	82	28.1	6.4
2. General Merchandise	147	157	6.8	197	25.4	258	30.9	75.5
3. Food Store	313	351	6.7	360	2.5	426	18.3	36.1
4. Auto Dealers	233	211	-9.4	289	36.9	324	12.1	39.0
5. Gasoline Stations	70	90	28.0	95	5.5	122	28.4	74.2
6. Apparel, Accessories	105	106	0.9	105	-0.9	131	24.7	24.7
7. Furniture Stores	68	77	18.2	66	-10.2	97	46.9	42.6
8. Eating, Drinking Places	126	124	-1.5	131	5.6	165	25.9	30.9
9. Drug Stores, Proprietary Stores	41	89	117.0	59	-33.7	72	22.0	75.6
10. Other Retail Stores	112	125	11.6	119	4.8	126	5.8	12.5
11. Nonstore Retailers	94	104	10.6	124	19.2	115	-7.2	22.3
Total Sales	1,431	1,539	7.0	1,678	9.0	2,073	23.5	44.8
					Iowa			
1. Lumber, Building Materials, Hardware, Farm Machinery	167	168	.59	159	-5.35	204	28.30	22.2
2. General Merchandise	166	163	-2.80	189	15.95	284	50.26	71.1
3. Food Store	323	375	16.09	388	34.66	459	18.29	39.0
4. Auto Dealers	274	269	-18.24	322	19.70	363	11.27	32.5
5. Gasoline Stations	103	121	27.47	138	14.04	168	21.73	63.1
6. Apparel, Accessories	59	96	62.71	89	-7.29	84	-5.61	42.4
7. Furniture Stores	75	77	1.26	67	-12.98	88	31.34	11.7
8. Eating, Drinking Places	97	97	0.00	106	9.27	140	32.07	44.3
9. Drug Stores, Proprietary Stores	40	40	0.00	49	22.50	58	11.83	45.0
10. Other Retail Stores	110	125	11.36	145	16.00	200	37.93	81.8
11. Nonstore Retailers	26	15	-34.61	25	66.66	32	28.00	23.1
Total Sales	1,601	1,672	4.43	1,825	9.15	2,316	26.90	44.6

SOURCE: Adapted from [23, 24, 25, 26].

most dramatic changes in retail sales in Illinois occurred in general merchandise, service stations, and drug and proprietary stores. General merchandise sales increased by 139 percent in Illinois and 97 percent in Iowa during this 23 year period. Likewise, the sales of service stations and drug and proprietary stores increased by 108 percent and 122 percent, respectively, in Illinois, but only 76 percent and 80 percent in Iowa. The smallest increase occurred in the sales of lumber, building materials, hardware, and farm machinery in Illinois and apparel and accessories in Iowa. However, not all sales increased consistently between each of the census periods. Automotive sales declined in both Illinois and Iowa between 1954 and 1958, and furniture stores and lumber, building, hardware, and farm machinery dealerships experienced sales declines between 1958 and 1963 in both states. This could be because of unusual increases or declines in these items in the year of the census or cyclical economic conditions for these classes of merchandise.

The Pattern of Change Among Sales Categories

The pattern of change among sales categories appears to be quite different among certain categories between Illinois and Iowa. The overall sales increased in Illinois 42 percent from 1954 to 1967; in Iowa it increased by 62 percent, about half again as much as in Illinois. Iowa, of course, started from a much lower base than Illinois, with 28 percent as much sales as Illinois in 1954 and 26 percent as much gross sales as Illinois in 1967. Three sales categories--general

merchandise, gasoline, and drug proprietary stores--increased over 100 percent from 1954 to 1967 in Illinois; these same categories in Iowa increased more than most of the other categories but, they did not have as large an increase. The largest increase in Iowa occurred in the category, other retail stores, with 207 percent, and the second largest increase occurred in the fruit stores in Iowa, with a 98 percent change in gross sales from 1954 to 1967. This very large increase in Iowa of other retail sales stores categories may be due to a greater number of stores in rural areas and smaller towns which cannot be directly categorized by the census in one of the other more specific sales categories. That is, in many smaller towns some stores sell items that would fall in several different sales categories and may be dropped into the other retail stores census category.

Food store sales in Iowa increased almost 50 percent more than those in Illinois. This change in food store sales is even more pronounced if we note that the population in Iowa from 1954 to 1967 only increased about 13 percent (from 1,900,000 in 1954 to approximately 2,200,000 in 1967, whereas the population in Illinois increased during the same period of time by approximately 20 percent, from 7,700,000 to 9,300,000). With a higher proportion of the population in Iowa outside of metropolitan areas, this likely represents a shift in the habits of people away from growing some of their own food in gardens and having their own meat and dairy supplies. It is also noteworthy that in the years when there were declines in certain sales categories, mainly

occurring in 1958 and 1963, the percentage of decline was much greater in Iowa than it was in Illinois. The agricultural economy, especially the livestock part of the economy, has been cyclical in nature, and since a much larger proportion of Iowa sales depends upon the agricultural economy than does Illinois, which has a more diversified economy with many industries, this larger decline in certain sales categories may be associated with cyclical relationships of the agricultural economy.

Table 2 indicates that per capita sales have changed substantially over the period studied. Again, the largest increases occurred in the general merchandise, service station, and drug and proprietary categories in Illinois. General merchandise sales increased by 75.5 percent, service station sales increased by 74.2 percent, and drug and proprietary sales increased by 75.6 percent.

The per capita increases in total retail sales from 1954 to 1967 were almost identical in both Illinois and Iowa with a percentage increase of 44.8 in Illinois and 44.6 in Iowa. The three largest increases in per capita sales in Iowa occurred in the general merchandise classification, which increased 71.1 percent, gasoline service station sales, which increased 63.1 percent (somewhat less of an increase in Iowa than Illinois), and other retail stores, with an 81.8 percent per capita increase. The per capita increases for most other categories were similar for Illinois and Iowa except for the category which includes lumber, building materials, hardware, and farm machinery sales. This category increased substantially more on a per capita basis in Iowa than it

did in Illinois. Since this category is more agriculturally oriented, this larger increase in Iowa is not surprising. It should also be noted that the per capita gross sales in Iowa in absolute dollar amount were higher than in Illinois for every census period reported. Total per capita sales in Iowa in 1958 were 9 percent higher than in Illinois, and in 1967 per capita gross sales in Iowa were 12 percent higher than in Illinois.

The Growth Rate of Retail Sales

The rates of retail growth that have been discussed cannot be considered as the real rates of retail change. Table 3 indicates that the Consumer Price Index changed substantially between 1954 and 1967, as well as between the other data year.

Table 3. U.S. consumer price index, 1954 = 100.

Year	Index
1954	100
1958	107.8
1963	113.9
1967	124.2

SOURCE: Economic Report of the President, U.S. Government Printing Office, Washington, D.C., 1973.

Adjusting the growth in dollar retail sales between 1954 and 1967 for the rate of inflation still depicts substantial growth in the same categories; however, the magnitude of growth has been substantially reduced.

Table 4 presents the percentage change in retail sales between 1954 and 1967 adjusted for the rate of growth of inflation and rate of growth of population.

Table 4. Adjusted percent change (per capita retail sales; constant dollars) 1954-1967.

		Illinois	Iowa
1.	Lumber, Building Materials, Hardware, Farm Machinery	-14.6	-1.7
2.	General Merchandise	41.0	37.8
3.	Food Stores	9.5	11.9
4.	Auto Dealers	12.1	6.7
5.	Gasoline Stations	40.2	31.3
6.	Apparel, Accessories	0.7	14.6
7.	Furniture Stores	15.5	-10.1
8.	Eating, Drinking Places	5.8	16.2
9.	Drug, Proprietary Stores	41.2	16.7
10.	Other Retail Stores	-9.4	46.4
11.	Nonstore Retails	-1.7	-0.9
	Gross Sales	16.7	16.4

SOURCE: Adapted from [23, 24, 25, 26].

Table 4 suggests that the larger rates of growth for both states occurred in general merchandise, gasoline stations, and drug and proprietary stores, and in Iowa in the other retail store category. However, unlike Table 2 or Table 3, Table 4 reveals that other retail stores in

Illinois. and nonstore retail, lumber, building materials, hardware, and farm machinery, and furniture stores in Iowa, actually experienced declining retail sales in real terms between 1954 and 1967. Lumber, building materials, hardware, and farm machinery declined by 14.6 percent in Illinois, with a very small decline in Iowa; other retail stores declined by 9.4 percent in Illinois while increasing by 46.4 percent in Iowa; and nonstore retails declined by 1.7 and 0.9 percent in Illinois and Iowa, respectively. The other retail stores category includes farm supply and feed stores which is likely why Iowa shows a substantial increase while Illinois shows a small decline. When adjusted for growth in population and inflation, apparel and accessory sales had a marginal increase of 0.7 percent in Illinois and 14.6 percent in Iowa over the 23 year time span. Some of the variation in rates of growth among sales categories between Illinois and Iowa is likely due to some differences in census classifications or more diversification of sales within individual stores in Iowa than Illinois.

The sales of general merchandise establishments (department stores, variety stores, and miscellaneous general merchandise stores), drug and proprietary stores, gasoline stations, and other retail stores, in Iowa were the only retail sales categories which experienced a real rate of growth larger than the overall growth in total retail sales.

Advances and(or) declines in the real rate of growth of sales in the retail categories may be indicative of the changing nature of consumer tastes and preferences for particular retail goods as well as for particular

types of retail establishments, along with some possible changes in categorization. (Changes in the real rate of sales could also represent some increase in price of a category of goods larger than the general price index increase, such as we are now experiencing in gasoline.)

Average and Proportional Retail Sales by Size of Place

Tables also were prepared to display the change in retail sales volume by urban-place size and location relative to larger urban centers. The urban places included in the study (those places exceeding 2,500 population in the data years) were stratified by population into the following inclusive size categories: 2,500-4,999; 5,000-9,999; 10,000-14,999; 15,000-19,999, 20,000-49,999; 50,000-99,000; and those urban places with 100,000 or more persons.

Average gross sales and the average for each census sales category were calculated for each urban center size group. The proportion of each sales category to total sales also was calcuated for each incorporated location of 2,500 or more population; these data are given in Table 1 through 8 in Appendix A. As a matter of reference, average gross sales and the average population for each size-class is calculated and given in Table 5 for Illinois and Iowa.

Many changes are observable in a temporal, as well as a spatial, sense. In Iliinois except for two size categories of towns for the period 1954 to 1958, there was a growth in gross retail sales in all

Table 5. Average retail sales and population for Illinois and Iowa by size of place.[a]

Illinois

Size of Place by Population	1954 Sales	1954 Population	1958 Sales	1958 Population	1963 Sales	1963 Population	1967 Sales	1967 Population
2,500-5,000	5,449.02	3,588	5,615.76	3,593	5,950.77	3,661	8,644.43	3,686
5-10,000	8,936.25	7,117	10,065.54	7,206	11,911.76	7,278	14,137.36	7,288
10-15,000	16,309.14	12,046	17,074.27	11,921	17,911.68	12,332	23,872.05	12,184
15-20,000	23,693.29	16,791	21,721.20	17,228	27,297.68	17,168	31,374.93	17,393
20-25,000	31,355.90	22,737	31,417.10	22,275	39,876.00	22,287	41,838.50	22,267
25-50,000	55,932.70	36,664	53,642.32	34,035	59,582.89	34,247	80,150.69	34,150
50-100,000	111,594.10	67,544	115,835.80	65,124	129,102.10	65,835	158,326.80	64,722
> 100,000	1,794,790.00	1,269,184	1,963,506.00	1,263,121	2,037,759.00	1,246,192	2,395,988.00	1,277,661

Iowa

Size of Place by Population	1954 Sales	1954 Population	1958 Sales	1958 Population	1963 Sales	1963 Population	1967 Sales	1967 Population
2,500-5,000	7,916.95	3,643	8,243.17	3,633	8,920.29	3,568	10,986.33	3,621
5-10,000	12,634.09	7,735	13,097.59	6,785	15,430.60	6,956	11,977.08	7,084
10-15,000	20,964.25	11,684	18,597.50	11,515	18,401.66	13,246	26,514.50	12,465
15-20,000	21,423.25	17,046	19,464.33	17,097	27,150.00	15,631	28,457.90	16,122
20-25,000	33,223.00	22,719	38,491.00	21,292	36,955.66	22,921	46,195.00	21,982
25-50,000	45,852.43	33,059	47,714.86	30,723	55,463.29	32,424	71,091.06	32,142
50-100,000	108,326.00	73,367	109,281.50	73,594	124,561.00	77,648	150,509.50	75,290
> 100,000	284,225.00	190,371	341,056.00	202,778	363,944.00	206,708	344,612.00	154,368

[a] Sales in thousands of dollars.

size classes of places for the three periods of time revealed in our data, Table 5, (1954 to 1958, 1958 to 1963, and 1963 to 1967). For the period from 1954 to 1968, the two size classes which showed an absolute decline in current dollar value of gross sales, were the 15,000 to 20,000 population-size group and the 25,000 to 50,000 population-size group. The number of places included in these two size groups increased in both cases; in the year 1954 there were 17 towns in both of these size groups, and in 1958 there were 25 towns in the smaller of the two size groups and 22 in the larger-size group. The average population for the class of 15,000-20,000 actually increased slightly during that period of time and decreased for the 25,000-50,000 size group during that period of time.

It is especially interesting to note what occurred with the Retail Sales Pattern Index in Illinois for those two size classes in the year 1958 compared to the other years 1954, 1963, and 1967. The Retail Sales Pattern Index may be found in Tables 1 through 4, Appendix A. In the years when gross sales actually declined in current dollar terms, that is in 1958 relative to 1954, the average Retail Sales Pattern Index for towns in both those size groups increased. This means that the proportion of sales in the different sales categories more closely approximates the expectation for those two size categories in the year 1958. This apparently indicates that as far as the wide range of offerings and availability of items to consumers were concerned, these two size classes of towns were less efficient during that period of time relative

to more recent periods and relative to other size groups. We have no ready explanation for this apparent anachronism. The Retail Sales Pattern Index is largest on the average in small towns and smallest on the average in the largest towns, as expected. This pattern is consistent for every data year in Illinois, again except for the year 1958, when the same two size classes of towns do not follow this pattern. The Average Retail Sales Pattern Index is about twice as large in the smallest-size class as it is in the largest-size class.

In Iowa sales growth over the period from 1954 to 1967 by town-size class was somewhat different than in Illinois, with gross sales increasing in all time periods for all size classes except for size class 10,000-15,000 in the years 1958 and 1963. There were declines both from 1954 to 1958 and from 1958 to 1963 in the 10,000-15,000 size class. Also in the size class from 20,000-25,000, there was a decline in average sales from 1958 to 1963, and in the size class from 15,000-20,000 there was a decline from 1954 to 1958. There was a change in the number of places in that category from two to three; from 1958 to 1963 one town which was in the 15,000-20,000 category moved to the 20,000-25,000 category. One might assume that this was the cause of the decrease in average gross sales from 1958 to 1963 with a small town moving into their group. However, the average population size for that group actually increased somewhat from 1958 to 1963, which would not tend to bear out this theory. The city of Des Moines was the only town over 100,000 in Iowa until the 1967 census revealed that Davenport had grown

to over 100,000, resulting in a substantial drop in the average population for the size class over 100,000 and also a drop in the average sales.

Table 6 shows the relationship of gross sales in 1958, 1963, and 1967 relative to gross sales in 1953 on the average for each size class of town by population in both Illinois and Iowa. Also included in the table is the price index for the years 1958, 1963, and 1967 for comparative purposes. In 1958 the gross sales declined relatively in several size classes of towns in both Illinois and Iowa. The largest relative declines were experienced by towns in the 15,000-20,000 and 25,000-50,000 size groups in Illinois. Again in 1963 there were certain size groups that on the average had a relative decline. These included the 2,500-5,000, the 10,000-15,000, and 25,000-50,000 size groups in Illinois and mainly the 10,000-15,000 size group in Iowa. When we consider the small sample size in Iowa with a new town coming into the over 100,000 size group, we find that no town declined relatively to the price index from 1954 to 1967. In Illinois the two small sizes have the largest growth, while in Iowa the 5,000-10,000 size group had the largest growth with the 25,000-50,000 group having the second largest growth from 1963-1967. The pattern in Illinois with small towns as well as towns up to 15,000 which grew faster than towns over 15,000 in gross sales relative to the price index, may indicate some movement to suburban areas in a highly populated state such as Illinois. In Iowa the greater growth of towns of 5,000-10,000 and 25,000-50,000 is likely related to their relative position in the trade area and the commuting to these size towns in an agricultural area.

Table 6. Current dollar sales in 1958, 1963, and 1967 relative to 1954.

Size Class by Population	Percentage of Gross Retail Sales to Sales in 1954		
	1958	1963	1967
		Illinois	
2500-5000	103.0	109.2	158.6
5-10,000	119.0	133.3	158.2
10-15,000	104.7	109.8	146.4
15-20,000	91.7	115.2	132.4
20-25,000	100.2	127.2	133.4
25-50,000	95.9	106.5	143.2
50-100,000	103.8	115.7	141.9
100,000+	109.4	113.5	133.5
		Iowa	
2500-5000	104.1	112.6	138.8
5-10,000	103.7	122.1	158.1
10-15,000	88.7	87.7	126.5
15-20,000	90.8	126.7	132.8
20-25,000	115.8	111.3	139.0
25-50,000	104.1	121.0	155.0
50-100,000	100.9	115.0	139.0
100,000+	120.0	128.0	121.2
Price Index	107.8	113.9	124.2

SOURCE: Adapted from [17, 18, 19, 20].

Tables 1 through 4, Appendix A, when considered as companions to Tables 5 through 8, Appendix A, lend emphasis to the analysis of data in the later tables. Looking solely at the average retail sales of the urban-size classes tells little of the relative sales distribution among size classes relative to the population location. By comparing the two sets of tables, the effects of urban size can be observed. As a matter of reference, the percent of gross sales and population for each size class is given in Table 7 for Illinois and Iowa.

In Illinois in 1954, the 79 towns in the smallest-size classification (2,500-5,000 population) had an average population of 3,588 persons. These towns represented 4.15 percent of the urban population in this data year. Of the total retail sales market of incorporated places, 4.40 percent belonged to this group. Thus, these smaller centers had a larger retail sales volume than their share of population would indicate. Noticeable deviations also occurred within sales categories. Towns within the 2,500 to 5,000 population range had 10.31 percent of the total retail marketings of lumber, building materials, hardware, and farm machinery. Given the rural nature of most small towns, this was expected. Likewise, these smaller incorporated places had a substantial share of gasoline sales--6.27 percent. Since "other retail stores" includes farm and garden supply centers as well as feed stores, the 4.16 percent market share accounted for by the smaller incorporated places is not surprising. Smaller incorporated places also had a tangible portion of the retail market of food stores and auto dealers--4.98 percent and 4.60 percent, respectively.

Table 7. The percent of retail sales and population for Illinois and Iowa by size of place.

Illinois

Size of Place by Population	1954		1958		1963		1967	
	% Sales	% Population	% Sales	% Population	% Sales	% Population	% Sales	% Population
2,500-5,000	4.40	4.15	4.35	4.29	4.99	5.15	5.74	5.07
5-10,000	7.22	8.23	7.62	8.40	7.83	8.03	7.41	7.92
10-15,000	6.00	6.35	5.02	5.40	5.55	6.41	5.89	6.18
15-20,000	4.12	4.18	4.49	5.91	4.54	4.79	5.11	5.88
20-25,000	3.21	3.33	2.80	3.05	5.12	4.80	4.38	4.84
25-50,000	9.72	9.12	10.51	10.27	12.15	11.72	14.00	12.37
50-100,000	10.27	8.90	12.38	10.72	13.65	11.69	15.67	13.29
> 100,000	55.06	55.74	52.47	51.97	46.18	47.00	41.83	44.46

Iowa

Size of Place by Population	1954		1958		1963		1967	
	% Sales	% Population	% Sales	% Population	% Sales	% Population	% Sales	% Population
2,500-5,000	14.50	10.68	12.62	9.30	13.64	9.96	13.05	9.96
5-10,000	18.87	16.11	18.34	15.89	20.14	16.58	19.77	16.24
10-15,000	4.04	3.61	4.88	5.06	4.12	5.41	3.00	3.27
15-20,000	4.13	5.26	2.56	3.75	2.03	2.13	4.02	5.28
20-25,000	3.20	3.51	3.37	3.12	4.14	4.68	1.31	1.44
25-50,000	15.47	17.85	14.62	15.74	14.48	15.45	18.09	18.94
50-100,000	26.10	28.30	28.69	32.31	27.88	31.72	21.28	24.65
> 100,000	13.70	14.69	14.92	14.84	13.57	14.07	19.99	20.22

Service related categories, however, had an extremely small market share accounted for by the smallest incorporated locations studies. For instance, general merchandise, drug and proprietary stores, and non-store retailers had less than one percent of their total retail volume in these small towns (.90, .79, and .20 percent, respectively).

Some general observations with respect to the proportion of the population in urban places that are in different size classes over time can be made. In Illinois there was a slight increase in the proportion of persons in towns in the smallest-size group, 2,500-5,000 people, but the most change occurred in towns over 20,000 population both with respect to increases and decreases in the proportion of population in those size groups. The most marked decline in proportion of population in one size group occurred in the towns over 100,000 population, with almost 56 percent of those living in urban places in Illinois in 1954 residing in cities of 100,000 or more. This proportion dropped to only 44 percent of the population by 1967, a decline of 20 percent. The main growth occurred in towns between 20,000 and 100,000 population in Illinois from 1954 through 1967. There was an increase of about 50 percent in the proportion of population living in these medium-sized towns in Illinois from 1954 to 1967. The number of towns falling in the 20,000 to 25,000 category increased from 10 to 18, the number of towns in the 25,000 to 50,000 category increased from 17 to 30, and the number of towns between 50,000 and 100,000 increased from 9 to 17. There was also some increase in the towns from 15,000 to 20,000, with

17 towns in that size class in 1954 and 28 in 1963. It might also be noted that the proportion of gross sales which occurred in towns of 100,000 or more declined from 1954 to 1967 even more than the proportion of population. While the proportion of population declined by 20 percent, the proportion of gross sales in towns of 100,000 or more declined 24 percent. This is undoubtedly one of the results occurring with greater movement to the suburbs and more shopping in outlying centers around large cities. Whether we may see a reversal of this trend because of the gasoline shortage and general energy crisis is an open question at this time.

In Iowa we can see even greater disparity in the small towns between the proportion of population living there and the proportion of retail sales made by establishments there. Very few changes in the proportion of population in the different size classes of Iowa towns have been made from 1954 to 1967. One of the likely reasons for less change in Iowa is the slower rate of population growth, with a population increase of approximately 12 percent in Iowa and almost twice that in Illinois. There was a 10 percent decline in population in towns between 2,500 and 5,000. There was very little change in the proportion of population in towns from 5-10,000 or 10-15,000 from 1954 to 1967, if we take into account the change in numbers of towns which fell in those categories and shifted from one size to another. Likewise, there was very little change in the categories from 15,000 all the way to 50,000 population. There were some substantial changes in the towns

from 50-100,000 and 100,000 and over. But most of these changes occurred because one town moved from the 50-100,000 category into the 100,000 and over category between 1963 and 1967. In the smallest category (the towns 2,500 to 5,000) there was from 9 to 10 percent of the population, but the gross sales ranged from 13 to 14.5 percent over the period of time. Also in the towns between 5 and 10,000 the percent of gross sales was substantially more than amounts sold in small towns, this is even more true in Iowa than in Illinois. For the most part the sales categories which have a much larger proportion of sales than would be expected by the number of people in the town are those sales categories which are closely related to the agricultural economy. They are the sales categories which farmers would be expected to make the most use of in their purchases of inputs as well as consumption items. For example, 56 percent of all the lumber, building materials, hardware, and farm machinery sold in Iowa was sold in towns of less than 10,000 persons, (whereas only 25 percent of the population in urban places resided in those towns). Gasoline station sales were 35 percent of all sales in Iowa towns of less than 10,000. This again emphasizes the problem small towns will have as the price of gasoline increases. The validity of this generalization depends on whether the amount of gasoline demanded declines in those locations as price increases. Also, 48 percent of all the sales categorized under other retail stores were made in Iowa towns of less than 10,000 persons. These stores include farm and garden supply centers as well as feed stores. This shows the

importance of the marketing of supplies in small towns to the agricultural economy of Iowa. For towns over 10,000 in Iowa, the proportion of sales in the various categories much more closely approaches the proportion that one would expect from the size populations which reside there.

The 142 Illinois towns which comprise the categories between 5,000 and 25,000 persons had a combined percentage of population of 22.09 percent in 1954. Their combined retail sales percentage was 20.55 percent.

Percentages of gross retail marketings in Illinois exceeded the percentage of population in the size classifications 25,000 to 50,000 and 50,000 to 100,000 persons. In fact, only four categories of retail trade come short of the percentage of population for towns between 25,000 and 50,000 persons. These were apparel and accessories, eating and drinking places, other retail stores, and nonstore retailers. Percentages of retail marketings indicated only three categories with sales below the proportion of population for the 50,000 to 100,000 size class. These were eating and drinking places, other retail stores, and nonstore retailers.

In those cities exceeding 100,000 persons, the percentage of retail activity deviated substantially from the percentage of population in some categories. While accounting for 55.74 percent of the population of incorporated places exceeding 2,500 persons in Illinois, these cities had only 35.56 percent of the retail sales of lumber, building materials, hardware, and farm machinery, 50.45 percent of food ,

sales, 47.77 percent of automotive sales, and 42.22 percent of gasoline service station sales.

Perhaps these deviations in retail marketings can be rationalized by considering that larger urban communities have little opportunity, or advantage, to market farm machinery. Further, more construction in larger cities is probably handled by large-volume contractors with integrated sales of lumber and hardware. It is likely these larger contractors are able to obtain their materials at a lower per unit cost. Moreover, some lumber, hardware, and building materials may be distributed directly to the consumer by wholesale establishments. The lower sales by automotive outlets and gasoline service stations is probably the result of greater availability and use of public transportation systems in the larger cities.

However, in those retail categories which could be classed as service oriented, the larger urban places accounted for the bulk of total retail sales. For instance, 90.53 percent of the sales of non-store retailers occurred in the larger cities in Illinois. Likewise, major contributions to total retail sales activity were transacted in those categories dealing with general merchandise, apparel and accessories, eating and drinking places, drug and proprietary stores, and other retail outlets.

The retail sales calculations for 1958, 1963, and 1967 show those changes which have occurred in the dollar distribution of retail trade. Table 7 indicates that the largest urban places, exceeding

100,000, declined in both population and retail sales in Illinois. However, cities exceeding 100,000 people grew in importance in Iowa. In 1967 these cities accounted for 44.46 percent of the population and 41.85 percent of the retail activity in Illinois. These larger urban places still maintained a large percentage of the retail activity associated with service establishments; however, their advantage has declined. These tables for 1967 revealed that in Illinois the largest-size classification accounted for 54.70 percent of general merchandise sales, 52.39 percent of the retail sales of apparel and accessories, 51.32 percent of the sales of eating and drinking establishments, and 48.87 percent, 43.42 percent, and 84.42 percent of the sales of drug and proprietary, other retail, and nonstore retail establishments, respectively. Part of this decline in the largest cities is likely explanable by movement to the suburbs and the development of outlying shopping centers.

Although the importance of the retail activities of the largest urban-size classification is unquestionable, growing relative importance for those urban-size classifications of 25,000 to 50,000 and 50,000 to 100,000 persons is indicated. A look at the succession of Tables 10 through 13 from 1954 to 1967 reveals temporal and spatial changes in the percentage distribution of retail activity. Although minor declines are experienced in some categories between data years, the total portrait is one of relatively greater growth for the intermediate-size classes of urban places.

Average and Proportional Distribution of Establishments by Size of Place

The average and proportional number of retail establishments within each sales category is also reported in the same population-size classes in Tables 9 through 16, Appendix A. Text Tables 8 and 9 summarize the average and proportional number of establishments by center size.

Appendix Tables 9 through 12 portray the average number of establishments by sales category and size of place. The succession of tables from 1954 through 1967 reveal several interesting observations. First, the average number of establishments of all retail types decreased for each urban-size class, in Illinois, for each of the four data years. Second, Iowa towns also experienced a noticeable decline in the number of retail establishments available to their citizenry between 1954 and 1967.

While there are other increases in the number of establishments for certain sales categories, the overall number of establishments declined in Illinois from 1954 to 1967 by 21 percent in the 2,500 to 5,000 size category, about the same in the 5,000 to 10,000 category, but a decline of almost 30 percent in the 10,000 to 15,000 size, a 26 percent decline in the 15,000 to 20,000 size, and about the same in all the larger-size groups in a range from 28 to 35 percent decrease. The largest decline in total number of establishments over the time period of analysis occurred in the size group 25,000 to 50,000 population, with a 35 percent decline in the total number of establishments.

Table 8. Average number of establishments by size of place.

	1954		1958		1963		1967	
	Illinois	Iowa	Illinois	Iowa	Illinois	Iowa	Illinois	Iowa
2,500-5,000	65.49	91.39	58.99	77.74	53.02	73.49	51.50	74.02
5-10,000	96.87	135.06	88.65	117.09	86.14	115.17	81.83	119.74
10-15,000	148.25	203.75	121.42	154.50	107.56	132.17	103.86	148.50
15-20,000	200.35	236.00	163.12	203.00	162.41	163.50	148.68	143.60
20-25,000	222.80	277.00	190.60	277.50	169.76	266.67	158.78	264.00
25-50,000	449.24	406.43	344.73	347.29	292.93	323.14	292.37	333.11
50-100,000	835.22	846.80	700.92	684.50	613.00	678.83	567.71	646.80
> 100,000	13,677.66	2,263.00	12,850.00	2,326.00	10,719.66	1,855.00	9,856.33	1,391.50

Table 9. The percent of establishments by size of place.

	1954		1958		1963		1967	
	Illinois	Iowa	Illinois	Iowa	Illinois	Iowa	Illinois	Iowa
2,500-5,000	6.47	17.98	6.65	15.62	8.07	17.56	8.09	17.38
5-10,000	9.57	21.68	9.76	21.51	10.28	23.50	10.14	23.43
10-15,000	6.67	4.22	5.19	5.32	6.05	4.62	6.81	3.32
15-20,000	4.26	4.89	5.28	3.50	4.90	1.91	5.73	4.01
20-25,000	2.79	2.87	2.47	3.19	3.96	4.66	3.94	1.48
25-30,000	9.55	14.73	9.82	13.95	10.85	13.19	12.08	16.76
50-100,000	9.40	21.92	10.89	23.57	11.77	23.74	13.29	18.08
> 100,000	51.30	11.72	49.93	13.35	44.12	10.81	40.72	15.56

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In Iowa the reduction in the total number of establishments from 1954 to 1967 by size of urban place on the whole was less than in Illinois. It ranges from a high of 39 percent reduction in the 15,000 to 20,000 size class to a low of 11 percent reduction in the 5,000 to 10,000 size class, if we ignore the larger-size class which had only one town up until 1967 when it had two towns, and the 20,000 to 25,000 size class which had two towns initially and has one town in 1967.

In Illinois, the retail sales categories in which the number of establishments did not decline from 1954 to 1967 were general merchandise stores for towns between 5-10,000, 15-20,000, and 20-25,000 in population, nonstore retailers for towns between 5-10,000, and gasoline stations for the large metropolitan places which exceed 100,000 in population. However, as stated earlier, the total number of retail establishments declined for each size of town. The largest decline in number of establishments for all retail sales categories occurred in food stores, where the number of stores often declined to one-half or even as much as one-third of the 1954 total. This, of course, is because of the demise of the "mama-papa" food store and the takeover of this retail business by the large supermarkets. The smallest decline in numbers of any retail sales categories came in eating and drinking establishments, drug stores and proprietary stores, and other retail stores. Essentially the same situation occurred in the state of Iowa. There was one size class of town and two retail sales categories in two different sizes of towns where there was actually an increase in

the number of establishments on the average from 1954 to 1967. This occurred in the other retail stores category in the town sizes from 5,000 to 10,000 and in the eating and drinking establishments in the town size from 20,000 to 25,000, in which there was only a sample of one town in 1967. As we recall, the other retail stores category includes farm supply and feed stores. The other large decrease in number of est blishments occurred in the food sales store category.

The average numbers of establishments of all retail types by center size seems to indicate clear differences between all size class categories. These same differences are also indicated in 1967. Perhaps no clear indication of a hierarchical pattern can be drawn from these differences in the number of establishments by center size; however, the apparemt differences do indicate the potential of a wider range of choice available to the residents and citizenry of the larger urban place.

Table 9 which indicates the proportion of retail establishments located in the urban place categories, points out the more prominent position of the small and intermediate-size urban center over the time interval 1954 to 1967. Towns in Illinois with a population range of 2,500 to 5,000 persons (which contained 4.15 percent of the urban population in 1954 and 5.07 percent in 1967) had 6.47 percent of total retail establishments in 1954. Their percentage had increased to 8.09 percent in 1967. Likewise, towns with a population range of 5-10,000, 15-20,000, 20-25,000, 25-50,000 and 50-100,000 persons all experienced increases in the percentage of retail establishments available to their residents and

environs. Two urban-size classes declined in the proportion of establishments available in those communities. These were towns with a population range of 10-15,000 and cities exceeding 100,000 persons.

The pattern of the number of establishments by sales category and by town size in Iowa was similar to that in Illinois. The small towns in Iowa had a somewhat larger proportion of the number of establishments relative to their population than did the small Illinois towns. This likely comes from a greater dispersion of towns in Iowa than in Illinois, with a more nearly comparable open country residential demand for retail sales from these smaller towns, that is, the towns under 10,000 population. These results bring into question the efficiency of using only the number of retail establishments to develop hierarchical orderings of urban centers without the consideration of the value of retail sales. Clearly, as we move from one town size to the next larger town size, the number of establishments declines relative to the population. This does not mean that the absolute numbers do not increase and that any individual person living in or near such a town does not have a wider choice of establishments in which to shop. In larger towns, however, shopping may be more difficult relative to the number of establishments than in smaller towns because there may be several shopping centers in or outlying a larger town, necessitating travel. In the smaller towns all retail businesses are usually within one business center. In Illinois the point where the proportion of the number of establishments becomes less relative to the proportion of population is in towns over 20,000 in

size. In fact, this is true throughout the period from 1954 to 1967. In the Iowa data there is only one town which falls in the 20-25,000 range, so this same comparison is not immediately apparent. However, it appears that the proportion of the number of establishments relative to the population declines throughout the town-size range but gets smaller than the proportion of population in towns above 15,000 persons. Two questions which these results evoke are: What is the number of persons served by establishments depending upon the size of town, and what is the dollar volume of sales per establishment depending upon the size of town?

Population Per Establishment by Urban Size

Population estimates for establishments by center size involved only the population of the urban places included in each urban-size class. Thus, the numbers discussed below do not include the population figures for the surrounding open country rural trade area served by the retail center of the total population that purchases locally produced goods and services. Therefore, the estimates presented in Tables 10 through 13 cannot be accepted as population threshold values for differing retail establishments; however, the estimates can serve as approximations of the threshold population necessary for maintaining a viable retail enterprise.

The data for 1954 are consistent with the researchers' expectations. Those retail categories which serve the day-to-day needs of the residential population are precisely those establishments which have the lowest average population per establishment.

Table 10. Average Population Per Establishment in 1954.[a]

Sales Categories	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
				Illinois				
				Population				
1. Lumber, Building Materials, Hardware, Farm Machinery	558.01	923.19	1306.21	1333.89	1659.62	1860.55	1825.51	2551.97
2. General Merchandise	1484.15	2121.60	2356.86	2798.56	3789.46	3147.91	3321.84	3685.91
3. Food Store	304.48	375.56	450.79	476.55	577.07	441.42	376.64	386.55
4. Auto Dealers	678.16	1070.90	1298.39	1479.03	1429.98	1385.08	1825.51	3535.33
5. Gasoline Stations	499.07	681.48	732.53	808.65	1024.18	805.28	891.34	1814.84
6. Apparel, Accessories	869.55	1054.83	955.20	1089.51	1072.49	957.43	938.11	945.50
7. Furniture Stores	987.71	1216.93	1543.28	1534.69	1578.94	1360.88	1482.67	2090.91
8. Eating, Drinking Places	289.85	372.08	423.49	346.84	572.71	365.56	370.21	394.27
9. Drug Stores, Proprietary Stores	1915.36	2602.89	2815.99	3171.71	3988.91	2770.16	2365.35	2431.38
10. Other Retail Stores	438.81	638.89	596.51	671.65	680.74	607.49	587.90	639.81
11. Nonstore Retailers	1638.57	1703.71	1480.07	1795.30	2030.07	1542.78	1595.53	1547.78
				Iowa				
1. Lumber, Building Materials, Hardware, Farm Machinery	289.58	448.05	677.34	921.40	1135.97	1278.54	1798.20	1746.52
2. General Merchandise	1048.66	1257.79	1797.57	2622.46	2065.40	2892.70	4643.46	4427.23
3. Food Store	325.70	395.44	379.97	362.68	575.17	447.61	459.69	451.11
4. Auto Dealers	514.58	686.82	865.50	1065.37	1228.08	1493.00	1706.20	1547.73
5. Gasoline Stations	336.79	412.63	467.37	710.25	770.15	753.70	824.34	749.49
6. Apparel, Accessories	536.52	642.44	649.12	909.12	841.46	1019.45	1273.72	1379.50
7. Furniture Stores	634.97	664.94	819.94	1117.77	1262.19	1345.44	1416.34	5439.17
8. Eating, Drinking Places	344.99	313.50	341.14	408.28	445.48	390.24	381.32	400.78
9. Drug Stores, Proprietary Stores	1412.48	1847.73	1797.57	2622.46	2391.52	2822.14	2601.65	1903.71
10. Other Retail Stores	308.29	372.18	424.88	563.50	554.13	597.97	660.96	689.75
11. Nonstore Retailers	640.85	737.78	819.94	1482.26	1893.29	1264.56	1273.72	1012.71

SOURCE: Adapted from [17].

[a] Includes only the population within the incorporated place.

Table 11. Average Population Per Establishment in 1958.[a]

Sales Categories	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
				Illinois				
				Population				
1. Lumber, Building Materials, Hardware, Farm Machinery	626.48	915.56	1618.95	1643.88	1437.09	1745.37	1948.85	2526.24
2. General Merchandise	1568.86	2364.92	3097.67	3338.73	3228.26	3515.32	3229.30	3693.33
3. Food Stores	379.38	501.23	583.68	698.05	762.84	646.81	526.61	464.15
4. Auto Dealers	873.22	1155.68	1518.93	1682.41	2716.46	1543.84	1800.67	3655.56
5. Gasoline Stations	523.64	696.83	882.07	901.03	1060.71	802.53	874.15	1531.67
6. Apparel, Accessories	861.19	964.59	1063.25	1281.83	1302.63	1132.77	1114.82	1048.81
7. Furniture Stores	986.16	1242.42	1289.85	1595.17	1637.86	1428.94	1410.63	1893.73
8. Eating, Drinking Places	304.99	425.95	511.57	481.22	566.79	482.76	416.57	397.79
9. Drug Stores, Proprietary Stores	1978.57	2710.24	349.38	3712.90	3592.74	3241.40	2761.45	2572.54
10. Other Retail Stores	487.69	649.53	703.76	778.83	901.82	697.82	670.80	655.25
11. Nonstore Retailers	2056.67	2541.55	3122.26	2594.56	2502.80	2176.64	2072.92	1912.85
				Iowa				
1. Lumber, Building Materials, Hardware, Farm Machinery	326.90	493.47	794.14	1221.21	967.84	1352.59	1928.23	7799.15
2. General Merchandise	968.19	1340.29	2558.92	2331.40	2365.83	2722.30	5017.78	3026.53
3. Food Store	452.54	513.30	639.73	545.64	448.36	607.51	676.20	540.74
4. Auto Dealers	597.01	753.91	1079.54	1165.70	1520.89	1433.74	2299.81	1704.01
5. Gasoline Stations	361.26	479.30	575.75	840.83	655.15	660.97	845.90	620.11
6. Apparel, Accessories	534.30	638.60	842.57	949.83	906.06	1102.88	1678.95	1469.40
7. Furniture Stores	691.11	626.17	1001.31	1068.56	967.84	1069.96	1752.24	1308.24
8. Eating, Drinking Places	286.40	369.26	404.04	423.89	405.57	436.23	562.37	397.60
9. Drug Stores, Proprietary Stores	1589.86	1888.06	2303.03	3205.68	3041.78	3308.64	3320.03	2253.08
10. Other Retail Stores	362.91	425.73	523.41	610.60	591.45	647.77	712.20	773.96
11. Nonstore Retailers	1842.97	1737.01	1867.32	2230.04	1851.52	2622.70	2207.82	1291.57

SOURCE: Adapted from [18].

[a] Includes only thepopulation within the incorporated place.

Table 12. Average Population Per Establishment in 1963.[a]

Sales Categories	Population 2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50,100,000	>100,000
Illinois								
1. Lumber, Building Materials, Hardware, Farm Machinery	729.49	1064.15	2006.35	1593.61	2595.01	2059.40	2464.39	3395.61
2. General Merchandise	1743.90	2253.29	3283.12	2586.89	3905.89	3654.84	3464.98	4708.53
3. Food Store	496.73	591.75	781.45	761.46	978.99	853.02	736.75	594.46
4. Auto Dealers	967.45	1087.92	2038.71	1593.61	2476.28	1841.98	1793.16	4388.00
5. Gasoline Stations	533.24	682.30	909.35	772.36	1144.62	943.54	949.21	1727.62
6. Apparel, Accessories	983.84	1118.68	1377.65	1144.50	1435.12	1433.60	1324.26	1246.19
7. Furniture Stores	923.47	1313.64	1761.67	2098.26	2559.94	1802.48	1956.86	2443.51
8. Eating, Drinking Places	242.15	419.59	586.54	666.11	754.72	582.65	525.17	436.31
9. Drug Stores, Proprietary Stores	1631.84	2789.31	3535.67	3893.68	4073.89	4073.45	3051.93	2849.52
10. Other Retail Stores	377.62	605.32	739.18	894.99	1021.21	880.64	782.41	762.81
11. Nonstore Retailers	1482.95	1773.59	1990.55	2345.88	2047.95	2288.79	2089.98	2242.69
Iowa								
1. Lumber, Building Materials, Hardware, Farm Machinery	365.73	552.08	1059.66	1302.58	1146.06	1656.70	2465.02	1968.64
2. General Merchandise	1170.33	1423.79	2740.51	2404.76	2546.81	3289.39	4159.72	5167.70
3. Food Store	526.23	678.18	826.57	1008.45	716.29	846.89	831.94	918.70
4. Auto Dealers	710.15	836.66	1621.93	1488.66	1206.38	1644.69	2089.18	1917.76
5. Gasoline Stations	363.91	491.77	679.27	919.47	492.79	732.15	847.07	774.18
6. Apparel, Accessories	575.95	695.62	1222.69	919.47	1109.09	1311.95	1688.00	1862.23
7. Furniture Stores	799.40	981.72	1690.95	844.91	1637.23	1194.56	1861.04	1737.04
8. Eating, Drinking Places	302.25	371.14	580.10	473.66	477.52	503.25	505.85	501.71
9. Durg Stores, Proprietary Stores	1643.73	2154.59	2943.51	3463.55	3619.15	3337.76	3376.00	2650.10
10. Other Retail Stores	318.61	381.61	729.12	665.14	528.95	652.20	761.25	801.19
11. Nonstore Retailers	1099.93	1323.20	1848.25	2842.00	1463.06	2063.34	1917.23	1627.62

SOURCE: Adapted from (19).

[a] Includes only the population within the incorporated place.

Table 13. Average Population Per Establishment in 1967.[a]

Sales Categories	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	100,000
				Illinois				
1. Lumber, Building Materials, Hardware, Farm Machinery	877.19	1904.04	2224.85	2275.93	2862.88	2517.23	2808.99	2758.14
2. General Merchandise	1616.06	2030.80	2874.80	2618.55	3455.20	3262.78	3326.66	4033.93
3. Food Store	593.47	711.42	928.70	966.37	1119.56	953.92	862.52	743.73
4. Auto Dealers	1010.04	1258.98	1983.39	1917.52	2585.83	1907.84	2039.12	4338.02
5. Gasoline Stations	577.16	674.82	952.91	947.57	1192.86	1006.39	1050.69	1747.14
6. Apparel, Accessories	1167.15	1266.27	1683.27	1503.24	1890.58	1436.90	1480.00	1362.04
7. Furniture Stores	1239.46	1474.00	1998.89	1961.86	2120.65	1652.44	1707.17	2512.26
8. Eating, Drinking Places	330.58	445.60	535.82	557.26	573.72	563.22	492.89	438.18
9. Drug Stores, Proprietary Stores	2177.08	2981.51	3603.63	3717.94	4404.43	3645.95	3050.21	3158.57
10. Other Retail Stores	474.77	606.22	740.54	730.21	894.65	712.95	726.33	759.22
11. Nonstore Retailers	1629.12	1694.91	1968.13	1963.91	1838.55	1836.04	1908.36	2676.58
				Iowa				
1.. Lumber, Building Materials, Hardware, Farm Machinery	397.11	598.87	1060.87	1832.00	1373.87	1681.84	2428.70	2412.00
2. General Merchandise	981.25	1050.57	2167.86	2370.82	1831.83	2371.13	3485.63	3182.84
3. Food Store	576.11	765.23	1017.57	1007.60	594.10	939.21	967.73	1106.58
4. Auto Dealers	758.41	863.88	906.56	1919.23	1156.94	1364.51	2045.91	1954.02
5. Gasoline Stations	388.98	462.56	692.51	798.09	666.21	767.31	902.75	753.01
6. Apparel, Accessories	644.46	727.08	1187.16	1550.15	1156.94	1291.41	2057.09	1816.09
7. Furniture Stores	760.47	860.88	1347.59	1529.90	1099.10	1285.68	2091.38	1642.21
8. Eating, Drinking Places	392.37	363.54	519.38	660.72	407.07	473.45	506.66	493.97
9. Drug Stores, Proprietary Stores	1311.15	2015.73	2493.05	3664.00	3140.28	3527.78	3551.40	3249.85
10. Other Retail Stores	306.64	328.82	484.08	683.11	563.64	579.71	695.83	745.73
11. Nonstore Retailers	938.85	1203.57	997.22	1612.16	2747.75	1642.63	1651.09	1409.75

SOURCE: Adapted from (20).

[a] Includes only the population within the incorporated place.

For Illinois towns with a population range of 2,500 to 5,000 persons, lumber, building materials, hardware, and farm machinery, food stores, gasoline stations, eating and drinking places, and other retail stores were the retail categories which exhibited the lowest average population per establishment. It is not surprising to see the other retail stores category included in this listing since the category includes fuel dealers, sporting goods stores, and farm and garden supply stores (including feed stores).

Those categories which required a larger average population per establishment were either retailing durable goods (autos, furniture), clothing (apparel, accessories), and specialty items (drugs), or engaged in selling a wide variety of products (general merchandise), and door-to-door sales (nonstore retailers). Each of these retail categories apparently take advantage of economies inherent in larger retail markets.

Study of 1967 data for the same urban-size classification reveals a similar trend, relative to average population served, among retail establishments. However, it is interesting that the average population per establishment increased for each retail category between 1954 and 1967. The most prominent factor in increasing the average population per establishment was not an increasing population but the huge demise in the number of retail firms. (Note Tables 9 and 12, Appendix A.)

Although some retail categories declined in average population per establishment between 1954 and 1957, the dominant trend reveals an increasing service area population per establishment. The most notable

decrease occurred in the general merchandise category. This category decreased in population per establishment in urban-size classifications 5,000-10,000, 15,000-20,000, and 20,000-25,000 people. The decrease in average population per establishment could be induced by either an increase in the number of establishments relative to the population, or a decrease in the population relative to the number of establishments. Tables 9 and 12 of Appendix A reveal that urban places of 5,000-10,000 and 15,000-20,000 increased in both average population and the average number of general merchandise establishments between 1954 and 1967. However, the growth in general merchandise establishments was at a more rapid pace than the growth in average population; therefore, the net result was a decline in average population per establishment. Urban places of 20,000-25,000 persons had both an increase in the number of establishments and a decrease in average population.

A similar trend in increasing the number of potential patrons per establishment over the period from 1954 to 1967 is true of Iowa towns. The major exception is the general merchandise category which declined for each urban-size classification except 10,000 to 15,000. The predominant reason offered as an explanation was the rapid rate of increase in the number of general merchandise establishments over the time period.

In most cases the number of potential patrons per establishment is greater in Illinois towns than it is in Iowa towns, especially for those towns of less than 10,000 persons. This again undoubtedly reflects a potentially larger trade area for towns of the smaller sizes in the

state of Iowa, so that the urban population itself makes up a smaller proportion of the total potential patronage for establishments in small towns. Whereas in Illinois the largest number of potential patrons per establishment for all establishments was found in towns of 20,000 to 25,000, this is not true in Iowa.

Of course, in looking at these tables we must remember that in Iowa there was only one town in 1967 having 20,000 to 25,000 persons and only two towns having 100,000 or greater population. Except for this one category (the 20,000 to 25,000 size class), for the most part the number of potential patrons for each type of establishment increases with increasing town size of 50,000 to 100,000 population. Therefore, for most sales categories, the largest number of potential patrons per establishment in Iowa is found in towns of 50,000 to 100,000 population. In 1967 there were only five such towns.

From 1954 to 1967 there were some dramatic changes in the number of patrons served by an establishment in different sales categories. For example, the number of persons served by food stores in most size categories more than doubled, while for eating and drinking places, the number of potential patrons increased only slightly with little variation caused by the different size classes of towns. In general, lumber, building materials, hardware, and farm machinery, general merchandise, auto dealers, drug and proprietary stores, and nonstore retailers had the largest number of service area patrons.

It is apparent that the population threshold necessary to provide the sales volume required by today's business establishments has increased.

However, it is not apparent that the threshold has increased uniformly by type of establishment or size of town. This conclusion may be examined more closely by studying those changes which have occurred in the retail sales volume of establishments and economies of size in retail sales. Following are the changes that have been occurring with respect to retail sales per establishment. We do not have data to indicate the extent of economies of size for various types of retail establishments.

Sales Per Establishment by Center Size

Tables 14 and 15 depict average retail sales per establishment by sales category and by center size. By comparing the average sales of establishments in 1954 with the average sales of 1967 (adjusted for change in the price index), growth in retail volume per establishment is easily detected.

Again, an initial comparison is made of those towns in Illinois having a population range of 2,500 to 5,000 persons. Substantial increases per establishment occurred in retail activity in all but one of the retail sales categories. This was the general merchandise stores which averaged 18 percent less per store in real terms.

The small towns in Iowa had a similar pattern of increasing sales in real terms per establishment from 1954 to 1967. However, there were more categories of retail sales which decreased in small towns in Iowa than in Illinois. Where general merchandise is the only class

Table 14. Average value of sales per establishment in 1954.

Sales Category[a]	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
				Illinois				
				Population				
1. Lumber, Building Materials, Hardware, Farm Machinery	107.97	116.33	142.90	171.16	177.78	182.28	143.38	126.84
2. General Merchandise	47.49	103.07	176.73	235.73	296.61	590.71	693.10	631.18
3. Food Store	113.37	123.95	155.73	167.65	205.39	151.10	139.26	109.68
4. Auto Dealers	182.97	213.35	306.14	386.15	446.38	423.65	616.28	706.53
5. Gasoline Stations	53.29	68.04	74.57	72.03	77.54	70.36	74.95	97.07
6. Apparel, Accessories	32.79	49.85	79.84	80.87	85.43	91.71	134.58	114.54
7. Furniture Stores	32.97	51.89	84.30	80.16	99.31	122.82	126.68	151.17
8. Eating, Drinking Places	31.13	26.54	43.25	39.26	49.04	42.01	44.36	55.39
9. Drug Stores, Proprietary Stores	15.10	50.25	104.66	132.91	170.38	132.45	118.64	110.83
10. Other Retail Stores	49.44	50.31	167.29	56.44	73.67	64.85	57.86	78.66
11. Nonstore Retailers	7.36	14.09	24.26	41.71	40.83	43.91	50.48	238.03
				Iowa				
1. Lumber, Building Materials, Hardware, Farm Machinery	115.56	118.13	141.20	106.79	150.10	148.34	196.52	149.93
2. General Merchandise	85.83	155.01	253.80	220.92	136.77	435.21	1096.72	964.02
3. Food Store	126.31	151.96	162.91	106.07	195.78	135.31	130.90	131.61
4. Auto Dealers	146.70	1807.61	243.38	125.89	354.89	391.74	460.18	492.15
5. Gasoline Stations	53.11	55.84	49.81	55.95	76.40	63.68	67.02	74.35
6. Apparel, Accessories	46.37	57.23	15.76	24.93	30.62	55.53	102.07	0.00
7. Furniture Stores	50.68	52.41	71.73	58.55	79.08	72.08	127.56	414.97
8. Eating, Drinking Places	28.22	32.22	31.01	28.20	34.48	34.14	38.34	40.32
9. Drug Stores, Proprietary Stores	30.93	58.51	59.34	84.84	130.89	85.95	135.31	100.67
10. Other Retail Stores	59.61	59.71	17.03	66.00	63.70	55.37	83.09	0.00
11. Nonstore Retailers	20.97	21.39	37.98	21.65	25.83	41.91	22.66	30.80

SOURCE: (17).

[a] Sales in thousands of dollars.

Table 15. Average value of sales per establishment in 1967.

Sales Categories[a]	Illinois Population 2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	100,000
1. Lumber, Building Materials, Hardware, Farm Machinery	128.93	141.65	179.59	164.77	227.58	193.43	183.16	160.19
2. General Merchandise	38.74	141.61	177.43	205.09	314.81	925.85	987.71	1031.42
3. Food Store	194.48	260.88	330.22	346.30	417.76	370.97	349.84	229.98
4. Auto Dealers	231.21	258.47	393.35	426.31	601.23	711.04	874.40	911.42
5. Gasoline Stations	84.13	88.81	101.63	119.61	133.46	114.70	118.23	126.84
6. Apparel, Accessories	65.55	80.18	105.19	108.06	134.74	160.54	189.86	169.46
7. Furniture Stores	46.31	70.69	122.17	100.81	124.34	198.66	163.06	201.09
8. Eating, Drinking Places	42.09	42.85	69.96	52.44	82.22	63.57	63.79	67.28
9. Drug Stores, Proprietary Stores	19.38	79.51	137.28	194.86	268.25	270.28	221.10	202.01
10. Other Retail Stores	55.70	58.79	51.01	62.69	94.09	79.18	80.60	75.45
11. Nonstore Retailers	9.64	11.75	46.88	32.56	38.52	63.90	83.12	469.42
				Iowa				
1. Lumber, Building Materials, Hardware, Farm Machinery	180.90	163.36	118.11	178.22	180.90	202.22	208.92	210.69
2. General Merchandise	59.52	101.81	0.00	188.96	221.34	531.95	1155.79	1217.79
3. Food Store	222.19	324.69	318.90	388.01	237.97	360.47	319.41	393.19
4. Auto Dealers	215.28	223.02	185.08	443.86	367.23	448.18	584.86	599.83
5. Gasoline Stations	75.94	83.14	74.14	85.96	101.98	94.60	100.35	92.15
6. Apparel, Accessories	39.21	55.35	24.72	102.60	0.00	52.25	153.46	175.56
7. Furniture Stores	36.16	52.92	81.44	73.01	110.70	112.52	126.28	157.52
8. Eating, Drinking Places	33.56	41.69	31.03	61.17	35.25	54.75	56.81	63.76
9. Drug Stores, Proprietary Stores	21.66	59.09	46.61	128.67	205.19	125.58	257.35	203.45
10. Other Retail Stores	96.94	94.32	71.32	45.49	93.33	82.41	71.85	74.57
11. Nonstore Retailers	10.47	17.85	40.54	29.95	0.00	29.72	35.91	82.41

SOURCE: (20).

[a] Sales in thousands of dollars.

that had a lower volume per store, this was repeated in Iowa with three additional classes of stores. Apparel and accessories, furniture stores, drug stores, nonstore retailers, and eating and drinking places all had declines in real terms per establishment. The most marked increase in Iowa was the increase in real terms in sales for food stores, an increase of 76 percent. In Illinois the sales volume per store in all sales categories seems to increase almost monotonically from one size town to the next larger-size town for all sizes up to approximately the 25,000 to 50,000 size level. From that point on to larger-size cities, the sales volume per establishment follows no distinguishable pattern. So there is apparently little, if any, advantage to an individual store or retail sales establishment to be located in a town larger than 50,000 with respect to total sales volume. If we assume that costs continue to rise slightly in larger cities for business places, then in Illinois it appears that the optimum-size city for most retail establishments is the town which falls in the 25,000 to 50,000 size range. In the state of Iowa this is somewhat more difficult to determine because of the small number of towns which fall in the medium and larger size category. For example there is only one town in the 25,000 to 50,000 size range, and there is only one town in the over 100,000 population-size range. The volume of business per establishment seems to increase only slightly or remain almost constant as we move from smaller to larger towns. Some of these are associated more with services where sales are closely linked with individuals performing a service, such as gasoline stations and eating and drinking places.

Relative Sales Index

Heretofore, we have discussed the general distribution of retail sales by category and by size of urban center. We have not discussed the relative distribution of retail activities within an incorporated place. To develop a feel for the retail structure of individual municipalities, a discussion of the distribution of sales among sales categories is important.

The Retail Sales Pattern Index gives us a basis for comparison of the relative retail sales distribution of various sizes of urban places. The index was computed as described earlier so that the proportion of sales in each retail category in each urban place could be compared with the proportions at the state level. Retail sales distributions at the state level were taken as being an acceptable indicator of aggregate consumer demand. This distribution may or may not be representative of the demand for retail goods by residents in different towns or areas of a state, but this seems to be the best approximation available.

The Relative Sales Pattern Index (RSPI) used in this study compares the actual dollar volume of sales of the various retail goods in a place to the state volume. If a place is providing a sufficient variety and adequate supply of goods demanded by consumers, the expected distribution of goods purchased among categories will be similar to that of the state. The RSPI exhibits the property that, as the index increases or approaches 100, the sales pattern of a particular town or

incorporated place deviates more and more from the pattern of sales for the state as a whole. The closer the index is to zero, the closer the sales distribution corresponds to that of the state or what we might call the "expected distribution."

The index of sales distribution varied considerably among data years; however, each data year presented a similar trend in the distribution of retail sales between urban-size categories. For example, in 1954, towns between 2,500 and 5,000 in Illinois had an average RSPI of 44.53 (see Table 16).

The average RSPI for towns in Illinois of between 5,000 and 10,000 population was 40.41. An index of 34.17 was obtained for urban centers with a population range of 10,000 to 15,000. The next three urban-size classes had successively smaller RSPI values, as one would expect: 28.61, 24.93, and 17.71. Urban places between 50,000 and 100,000 persons had a larger RSPI (18.31) which was not expected. The difference is small, however, and may not be significant. This may be an indication of specialization in some particular retail types or possibly a difference in tastes or consumption patterns of persons in different-sized places. The average RSPI score for towns of 100,000 or more is the lowest of any size class at 12.52, as we would expect.

A similar pattern is found for the RSPI in Iowa for towns of different size classes. We find in looking at Table 16, for 1954, that the average RSPI for towns of 2,500 to 5,000 is 29.21, which is the highest index and the smallest-size class of towns. The index does not

Table 16. Relative sales pattern index, 1954.[a]

	Illinois Population							
	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
Mean	44.53	40.41	34.17	28.61	24.93	17.71	18.31	12.52
Range	23.14-98.32	12.88-71.82	13.73-55.85	11.72-77.48	15.59-39.99	11.46-30.38	11.14-25.60	11.45-14.04
Variance	241.70	235.34	158.26	262.54	56.87	283.45	183.19	37.50
Standard Deviation	15.54	15.34	12.58	16.20	7.54	16.83	13.54	6.13
	Iowa							
Mean	29.21	21.26	21.21	22.43	13.50	15.06	11.81	16.90
Range	13.06-87.05	9.45-40.11	15.75-35.29	12.80-31.13	9.64-17.36	8.94-26.49	9.63-14.48	16.90-16.90
Variance	145.87	74.43	88.63	58.21	29.78	32.25	3.25	0.00
Standard Deviation	12.07	8.62	9.41	7.62	5.45	5.67	1.80	0.00

SOURCE: Adapted from (17).

[a] Calculated as shown by the formula in Section II.

consistently get smaller as we go from the smallest-size class to each successive larger-size class, but there is a significant decline in the index in towns over 20,000 persons.

If we compare the beginning and ending of the data period from 1954 to 1967 shown in Tables 16 and 19, we find the same monotonically decreasing function of the RSPI as we go from small towns to larger towns. We also find that the RSPI has increased from 1954 to 1967 within each town size for every class. This is for the state of Illinois. In Iowa in 1954 the RSPI followed a pattern similar to that in Illinois, with the highest RSPI in towns of 2,500 to 5,000 at 29.21. This index generally declined as the town size increased. However, there were a couple of exceptions to this rule. One is in the town size which falls in the 25,000 to 50,000 range, and the other is in towns of 100,000 or more. The latter is likely due to the fact that there are only two Iowa towns in the largest-size group and only one town in this largest-size group in 1954, the city of Des Moines.

A further comparison of interest between Illinois and Iowa with respect to the RSPI is the initial and final RSPI's in 1954 and 1967 for towns of similar size. Except for the largest-size class, the RSPI in 1954 was higher on the average for Illinois towns in all corresponding-size classes. This was also true for the year 1967. Not only were the RSPI's higher in Illinois for all towns less than 100,000 but in most cases they were substantially higher. This lends further support to the idea that there is a lesser variety of goods being offered in small

Table 17. Relative sales pattern index, 1958.[a]

	Population							
	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
Illinois								
Mean	49.87	44.23	40.28	33.39	31.64	23.35	19.66	14.40
Range	19.10-97.51	20.18-81.02	17.13-95.32	9.73-65.08	13.75-49.61	10.35-52.74	10.06-37.33	12.47-16.44
Variance	352.52	356.13	271.43	206.43	100.05	89.11	57.11	3.94
Standard Deviation	18.77	18.87	16.47	14.36	10.00	9.44	7.55	1.98
Iowa								
Mean	27.13	22.77	24.04	20.98	19.64	13.11	11.31	8.95
Range	15.54-45.07	7.27-60.57	16.08-36.78	19.95-21.68	19.63-19.66	7.74-20.71	8.28-16.81	8.95-8.95
Variance	60.96	120.61	52.51	.83	0.00	14.75	9.00	0.00
Standard Deviation	7.80	10.98	7.24	.91	0.00	3.84	3.00	0.00

SOURCE: Adapted from (18).

[a] Calculated as shown by the formula on page 29.

Table 18. Relative sales pattern index, 1963.[a]

	Illinois Population							
	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
Mean	51.34	46.66	44.17	33.92	32.32	26.60	20.44	14.6
Range	17.22-95.67	15.28-97.90	14.93-85.53	12.31-61.08	14.50-46.83	13.03-51.94	11.20-35.52	13.04-17.26
Variance	237.38	442.02	229.60	244.29	80.58	138.96	47.32	5.12
Standard Deviation	15.40	21.02	15.15	15.62	8.97	11.78	6.88	2.26
	Iowa							
Mean	31.07	24.76	32.24	21.68	14.64	13.76	12.91	13.4
Range	12.80-94.45	9.65-86.24	23.06-42.10	17.61-25.75	13.83-15.93	7.21-22.87	8.08-19.47	13.47-13.47
Variance	197.84	253.24	81.81	33.12	1.27	38.14	13.53	0.00
Standard Deviation	14.06	15.91	9.04	5.75	1.12	6.17	3.67	0.00

SOURCE: Adapted from (19)

[a] Calculated as shown by the formula on page 29.

Table 19. Relative sales pattern index, 1967.[a]

	Illinois Population							
	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	100,000
Mean	56.25	49.48	45.47	40.07	32.96	28.07	18.45	12.66
Range	25.95-96.40	21.11-96.61	8.30-81.68	12.91-81.42	12.97-46.58	9.20-57.51	9.39-40.38	11.15-14.43
Variance	362.86	615.98	315.36	389.68	91.95	182.64	69.79	2.73
Standard Deviation	19.04	24.81	17.75	19.74	9.58	13.51	8.35	1.65
Percent Change in RSPI from 1954-67	26%	22%	33%	40%	32%	58%	1%	1%
	Iowa							
Mean	37.09	30.97	42.64	26.14	14.62	15.51	13.44	14.42
Range	13.07-80.71	12.55-81.52	22.66-85.46	18.40-45.19	14.62-14.62	10.12-23.05	12.43-16.35	14.18-14.67
Variance	222.08	242.03	854.05	147.65	0.00	19.88	2.71	.11
Standard Deviation	14.90	15.56	29.22	12.15	0.00	4.46	1.65	.33
Percent Change in RSPI from 1954-67	26%	46%	101%	16%	8%	3%	13%	-15%

SOURCE: Adapted from (20).

[a] Calculated as shown by the formula on page 29.

Illinois towns than in Iowa towns and that there is likely greater specialization of sales in towns in Illinois. These contentions are further born out by the additional data given in Tables 16 through 19 which include the range for the RSPI's as well as their variance and standard error. In both 1954 and 1967, the range in the RSPI as well as the standard deviation is larger in Illinois towns than in towns in Iowa. It may be noted that there is no range of variance or standard error on the 100,000 and over class in Iowa in 1954, since there is only one town in that class; the same is true of the 20,000 to 25,000 size range in 1967, since there is only one town in that particular class.

While the absolute value of the RSPI is higher for all towns in Illinois, except those exceeding 100,000 people, at the end of the period as well as at the beginning of the period, the change which occurred between the two states is somewhat mixed if measured on a percentage-change basis. While there was an increase in the RSPI for all classes from 1954 to 1967 except for the 100,000 and over class in Iowa, the percentage change in the 10,000 to 15,000 size class in Iowa was the largest, with a 101 percent increase in the average RSPI for those towns. The range also increased substantially in that class with the extremes at 15 and 35 in 1954 and the extremes from 22 to 85 in 1967. Without investigating each specific town in that class, this would indicate that either there was a substantial decline in the sufficiency of goods being offered in one or more of the towns in that class or there was a specialization development of a large volume of sales in a particular sales class. It would be easy to determine which of these

occurred by selecting those towns in that size class and examining the RSPI and the per capita sales. Table 19 shows the percentage change in the RSPI from 1954 to 1967. Something very similar must have happened in Iowa in towns in the 5,000 to 10,000 size class; however, the average increase in the RSPI was not as great as in the 10,000 to 15,000 size class. Otherwise the remaining percentages in Iowa follow a fairly consistent pattern. In Illinois the largest percentage increase in the average RSPI occurred in the town size from 25,000 to 50,000 persons. There was an increase in the range with a change at both extremes. This substantial increase in the RSPI for towns of that size suggests that, in Illinois, towns of 50,000 to 100,000 population are now taking over the function of true urban-central places from many towns in the 25,000 to 50,000 population range, which undoubtedly served to a large degree this function in past years. This likely comes partly from some towns moving into the next category over this time period and partly from more interstate highways criss-crossing through urban centers which expands the trade area.

Successive declines in mean RSPI scores are encountered as we move left to right across the tables from smaller to larger urban classes. The ranges and variances of RSPI scores become smaller as larger urban classes are studied. This indicates that as towns become larger, they become more like other urban places their size, in the retail goods made available to their citizenry and hinterland.

The fact that the standard deviations of RSPI scores become smaller with larger urban classes also seems to indicate that as towns become

larger, they tend to cluster around a particular index score which in indicative of towns of that particular size.

Meanwhile, smaller urban places tend to have a great deal more variability in their retail availabilities. Towns between 2,500 and 10,000 people tend to have extremely large ranges, variances, and standard deviations. Inferences can be drawn which conclude that some small communities have retail sales distributions which approach, or are better than, cities much larger in size. Others, however, have RSPI scores which would indicate a sales pattern which deviates substantially from the aggregate retail sales pattern.

Community specialization in a particular retail business, or the absence or minuteness of a retail type in an urban place, can both lead to large RSPI scores. A thorough understanding of a community's retail structure would, then, depend on the ability to identify and separate the two economic forces. Per capita sales is the statistic that can usually give this additional insight.

Summary

This chapter has pointed out the massive role that large urban centers play in the retail sector. The distribution of gross retail sales and the distributional patterns of population are very close; however, there is a higher percentage of establishments with smaller business volume in the smaller urban centers. Further, it is shown that while the average number of establishments per urban center has declined, the population and sales per establishment have increased. Some evidence was

presented to show that basic items of family consumption are influenced by the distance to an urban center. These items are food sales, general merchandise sales, drugs and proprietary sales, and to some extent, apparel and accessory sales.

An index of relative sales distribution was presented and discussed. From this index it was inferred that, although small towns are relatively inferior to larger urban centers in their distribution of retail sales, many smaller communities are on a par with their larger urban neighbors with respect to sufficient variety and adequacy of supply of retail goods, at least to the extent of having as many classes or categories of goods available.

During the period of study from 1954 to 1967, most small towns slid backwards in their ability to furnish the expected distribution of retail goods. On the average this was true of towns up to 50,000 persons in Illinois and up to 20,000 persons in Iowa. Small towns in Iowa had better RSPI's than small towns in Illinois, indicating that most small towns in Iowa are still providing many trade center functions for their residents and for those in the open country within their historic trade areas.

In Illinois many small towns have become adjuncts to large urban centers; these small towns have lost their trade center functions and have become more like bedroom communities. Also, there are more urban centers of 25,000 to 50,000 and over 50,000 in Illinois than in Iowa. These larger urban centers are somewhat more evenly distributed

geographically, so that a larger proportion of the population in small towns and the open country in Illinois are within commuting or at least occasional shopping distance from these larger urban centers than in Iowa. The greater distribution and extent of interstate highways in Illinois has influenced this change in Illinois.

III. REGRESSION ANALYSIS OF RETAIL SALES DISTRIBUTION

Hypotheses

A two-dimensional graph is inadequate to depict the relationships among a large number of variables. Multiple regression analysis was used to allow the simultaneous evaluation of the effects of several explanatory variables upon the distribution of retail sales. The dependent variables analyzed here by regression are: (1) gross retail sales over all sales categories, (2) per capita retail sales, and (3) the relative sales pattern index. The unit of observation is the urban place. All urban places in Illinois and Iowa with 2,500 or more persons are observed for the years 1954, 1958, 1963, and 1967.

It was hypothesized that the distance between a community and a large urban place, as well as the distance between a community and its nearest larger neighbor, would have a significant effect upon the ability of the town's retail sector to offer a large variety, or a high volume, of goods for consumer purchase. The hypotheses are that as distance from larger urban places increases, gross as well as per capita retail sales of the community should increase. Distance variables used in an explanatory manner included: (1) distance to urban places exceeding 50,000 persons, (2) distance to towns greater than 25,000 in population, and (3) the distance between a municipality and its nearest larger incorporated neighbor. These hypotheses are based on results from previous studies, economic location theory, and our own observation.

Rectangular distances among all towns over 2,500 persons were calculated by using the given latitude and longitude of each town and a trigonometric formula which accounts for earth curvature. Then a special computer program written for this purpose compared distance among towns to determine the appropriate distances to use for each town to its larger reference towns. In some cases the diagonal distance between towns would be more appropriate than the rectangular distance to approximate the road mileage, but in Iowa and Illinois most of the roads follow the rectangular grid system so that errors in using this method are few and relatively small. While it may have been somewhat better to use actual road mileage, to obtain and calculate these distances among all towns (250 factorial in Illinois alone) would have used more of our research resources than we could justify. An even better measure of distance might be the average time it takes the ordinary commuter or shopper to travel between places. With rising energy costs and gasoline shortages, a cost function which includes both time and distance may be the most appropriate measure. This could be done on a case study of a small region with a limited number of places. However, given the cost and time factors in doing this study, the calculated rectangular distance among towns was the most feasible.

Specification of variables

Several combinations of variables were used to test the different hypotheses. The following relationships were estimated for (1) all places in each state exceeding 2,500 persons, (2) places exceeding 2,500

persons but less than 25,000 persons, and (3) places exceeding 2,500 but less than 10,000 persons:

$$(GRS, RSPI, PRS) = f(t_2, t_3, t_4, D_{mlt}, D_{25}, D_{50}, P)$$

where:

GRS = Total gross retail sales,

RSPI = Relative Sales Pattern Index,

PRS = Per capita retail sales,

$t_2 = \begin{cases} 1 & \text{if the year of observation is 1958,} \\ 0 & \text{otherwise} \end{cases}$

$t_3 = \begin{cases} 1 & \text{if the year of observation is 1963,} \\ 0 & \text{otherwise} \end{cases}$

$t_4 = \begin{cases} 1 & \text{if the year of observation is 1967,} \\ 0 & \text{otherwise} \end{cases}$

D_{mlt} = Distance to the nearest larger urban place,

D_{25} = Distance to the nearest urban place of 25,000 persons or more,

D_{50} = Distance to the nearest urban place of 50,000 persons or more, and

P = Population of the urban place observed (the unit of observation).

Places which did not have an observation on the dependent variable in each of the data years were deleted from the sample. The final sample in Illinois contained 242 observations in each of the four data years for a total sample size of 968 observations. The sample of towns less than 25,000 persons had 808 observations on the dependent variable, and the sample of towns less than 10,000 persons had 556 observations. The corresponding sample sizes for Iowa were 368, 312, and 272.

Regression Results

Gross Retail Sales

Several mathematical formulations for the regression equations were used including quadratic and logarithmic forms. The complete list of variables used in various formulations is given in Appendix Table 17. The full correlation matrices for this set of variables for both states and for different town size classes are given in Appendix Tables 18 through 23. Although there are some very high intercorrelations shown in these tables, these are from variables which are mathematical functions of each other and are not used in the same regressions. Therefore, there are not multicollinearity problems in any of the regressions reported. One equation was selected to report each subclass of relationships on the basis of consistency among equations and between states with respect to the variables which were significant, the statistical significance level of parameter estimates, and the mathematical form. The equations selected were among those having higher R^2's but may not have been the highest in a group if the other foregoing criteria were considered more relevant for selection.

Gross retail sales are explained first for all towns of 2,500 persons or more in each of the two states. Second, regressions were estimated for the subset of towns equal to or greater than 2,500 but less than 25,000 people and for those towns from 2,500 to 10,000 persons. The statistics for these regression results are given in Table 20.

Table 20. Regression results for gross retail sales.

State	Intercept	t_2	t_3	t_4	D_{mlt}	D^2_{mlt}	D_{25}	D^2_{25}	P	P^2	R^2
	Places of 2,500 persons and larger										
Illinois	-22,865	1,937	5,244	16,783			439.1	-3,219	254	-.0000002	.98
	(6.68)	(.53)	(1.44)	(4.58)			(3.14)	(2.13	(34.66)	(12.79)	
Iowa	-1,542	970.4	3,498	11,530			315.4	9,324	153	-.0000001	.97
	(1.14)	(.75)	(2.71)	(8.94)			(1.52)	(1.01)	(34.72)	(5.49)	
	Places equal to or greater than 2,500 but less than 25,000 persons										
Illinois	-4,946	558	3,234	6,998	148.3	-.60	98.45	-.77	1.57	-.0000001	.61
	(4.34)	(.77)	(4.53)	(9.44)	(4.47)	(3.44)	(3.01)	(2.38)	(8.10)	(.12)	
Iowa	4,487.2	37,532	2,116	5,800	373.2	3.32	72.28	1.20	1.58	-00001	.81
	(4.43)	(.73)	(4.19)	(11.13)	(7.31)	(4.05)	(.84)	(.32)	(9.68)	(1.44)	
	Places equal to or greater than 2,500 but less than 10,000 persons										
Illinois	-5,033	901	2,638	5,170	238.8	-2.31	54.74	-.40	1.83	-.0003	.47
	(2.70)	(1.62)	(4.63)	(8.94)	(5.57)	(3.62)	(2.13)	(1.63)	(2.89)	(.52)	
Iowa	[illegible],222	245.6	2,097	5,331	260.4	2.07	20.35	.99	1.24	-.0004	.76
	(1.41)	(.53)	(4.53)	(11.48)	(5.35)	(2.75)	(.26)	(.30)	(2.09)	(.85)	

NOTE: Numbers in parentheses are the corresponding t values without the signs.
Values of t exceeding 1.900 are significant at the 5% level for all regressions.
Values of t exceeding 2.617 are significant at the 1% level for all regressions.

The highest R^2 occurred on the equations where all towns of 2,500 persons and larger were included both in Illinois and Iowa. As one would expect the most significant variable affecting gross retail sales was the population of the town. The distance a town is from another town of 25,000 or larger also affected retail sales. As the distance from a town 25,000 or larger increased, retail sales also increased. This was a curvilinear relationship in Illinois with the increment to sales from added distance declining with distance. These variables, however, did not appear to be statistically significant in Iowa. Different intercept levels for different years were included in all equations as measured from the initial data year of 1954. The intercept for 1967 was significantly higher in Illinois, as were the intercepts for 1963 and 1967 in Iowa. These intercept variables remove part of the variation in gross retail sales stemming from two sources. One source is the rate of inflations which has caused a change in dollar value from one period to the next, and the other is the change in real growth of retail sales.

For the towns under 25,000 persons in both Illinois and Iowa, distance to the nearest larger town was also significant. This variable can be conceived partly as a proxy variable for the size of the trade area for a particular town. The distance to the nearest larger town is calculated in the same way as for the other distance variables; that is, distance is the rectangular distance calculated by using the given latitude and longitude locations of each town.

Both the linear and quadratic form of the distance variable to the nearest larger town are statistically significant. In Illinois this effect appeared to taper off with increasing distance to the nearest larger town, as shown by the negative quadratic term, whereas in Iowa it appears to still be increasing as distance to the nearest larger town increases. Both the major distance variables--distance to the nearest larger town and distance to towns over 25,000 persons--were significant for the Illinois data. In Iowa when the distance to the nearest larger town was included as well as the distance to towns over 25,000, the latter variable was not statistically significant. The R^2 for the Iowa regression for towns under 25,000 is substantially higher than for the Illinois regression, which would indicate that there may be somewhat greater homogeneity of Iowa towns. Here again the dummy variables for the years of observation are included to help remove the effect of inflation and increase in real gross sales. The variables for both years 1963 and 1967 are significant.

The next step was to take the subset of towns from 2,500 to 10,000 persons in size and estimate the same relationships with respect to gross retail sales. Here the same set of variables was highly significant, having the same sign as in the previous set of regression equations, but both equations had lower R^2's than the previous set. However, the Iowa regression still had a more substantial R^2 value than the regression for Illinois.

These regression results support our hypotheses with regard to distance and size of place both in Illinois and Iowa. Distance to towns

over 25,000 in population is more important when all towns over 2,500 persons are included in the regression. This, of course, includes the distance to towns that may be smaller than some towns that are being observed in the regression equation, since all towns are included in this first set. Then the distance to the nearest larger town becomes a more important distance variable for the towns that are less than 25,000 persons. Thus the regressions not only support our hypotheses with regard to the effect of size of town and distance on gross retail sales, but they also give some quantitative estimates of the effect.

Relative Sales Pattern Index

The RSPI was developed as a single-valued function to describe the range and the relative volume of retail sales by category in each town. As explained earlier the RSPI compares the relationship of various categories of retail sales for each town to the pattern of sales in the state as a whole. The index approaches zero as the sales pattern approaches the expected value, and it increases as the sales pattern deviates farther from the expected pattern. Our hypothesis is that as distance to the nearest larger town increases, the sales pattern should more closely approach the expected sales pattern (a decline in the index); and as distance to the nearest larger town of over 25,000 increases, we would expect the sales pattern index to decline. As population increases, we would also expect the sales pattern to approach the expected sales pattern, and thus the index would decline.

The regression results for the RSPI are given in Table 21. The same three subsets of towns were used to estimate these relationships for both Illinois and Iowa.

Logarithmic formulations of these relationships gave the best results with respect to fit of the function. The R^2 values were substantially lower than for the gross retail sales regressions. For all places over 2,500 persons in Illinois, only 38 percent of the variation in the RSPI was accounted for by these regression estimates. However, all the hypothesized variables included were highly significant, and the signs of the variables were in the direction hypothesized. In the Iowa regression, the distance to towns over 25,000 persons was not significant, whereas the distance to the nearest larger town was highly significant, as was the size of town. Again the dummy variables for the different years of data observation were included and were significant for certain years. All years were significant in the Illinois regression, and in the Iowa regression, the year 1967 was significant. However, the meaning of the dummy variables is different than the meaning for the gross retail sales, because the dependent variable is quite different. These dummy variables indicate that the RSPI has been increasing over this period of time from 1953 to 1967 with significant increases in Illinois in all three years of observation following the initial year and a significant increase in only the last year of observation in Iowa. This means that in more recent years the relative sales among sales categories has deviated more from the expected sales. On

Table 21. Regression results for the relative sales pattern index.

State	Intercept	t_2	t_3	t_4	$\log D_{mlt}$	$\log D_{25}$	log P	R_2
	Places of 2,500 persons and larger							
Illinois	135.45 (31.72)	2.67 (2.23)	2.33 (1.94)	4.16 (3.46)	-8.95 (11.04)	-3.15 (6.12)	-22.17 (19.10)	.38
Iowa	79.82 (15.17)	.52 (.38)	.42 (.30)	5.38 (3.88)	-4.70 (4.05)	- .89 (1.30)	-12.81 (10.07)	.31
	Places equal to or greater than 2,500 but less than 25,000 persons							
Illinois	155.67 (19.22)	2.89 (2.18)	2.83 (2.12)	5.60 (4.10)	-7.58 (7.51)	-5.95 (8.08)	-27.09 (13.32)	.28
Iowa	81.81 (8.28)	.29 (.18)	.56 (.35)	6.31 (3.97)	-6.77 (3.97)	-1.47 (1.74)	-12.60 (4.85)	.18
	Places equal to or greater than 2,500 but less than 10,000 persons							
Illinois	143.78 (10.62)	1.54 (.96)	1.36 (.83)	4.70 (2.81)	-9.43 (6.25)	-7.90 (6.65)	-22.43 (6.28)	.25
Iowa	99.43 (6.65)	.55 (.32)	2.96 (.02)	6.76 (3.88)	-5.60 (2.97)	-2.13 (2.30)	-17.70 (4.27)	.18

NOTE: Numbers in parentheses are the corresponding t values without the signs.
Values of t exceeding 1.900 are significant at the 5% level for all regressions.
Values of t exceeding 2.617 are significant at the 1% level for all regressions.

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the other two subsets of towns, those between 2,500 and 25,000 and those between 2,500 and 10,000, this effect shows up even more, with the most significant increase in the deviations from the expected sales pattern occurring in the smaller towns in the last year of observation (1967). All distance variables continue to be significant in the smaller-size towns in both Illinois and Iowa.

We found when looking specifically at the RSPI that the variance of the index was larger in small towns, and this is probably why we have been less able to explain a large share of the variance of the retail sales pattern index with the hypothesized variables. There are obviously other factors affecting the retail sales pattern index. This variance in small towns may be due in part to their changing function and to specialization of a few businessmen in certain sales categories. These sales categories may differ from one small town to another depending on the personal preferences and advantages held by individual businessmen. However, it is gratifying that the variables which have been hypothesized are significant and have the expected effect. If the index was an aggregate index of a town and its nearest smaller neighbors, we hypothesize it would show less variation and be more consistent for towns within its town-size category.

Per capita retail sales

The third dependent variable used is per capita retail sales, with the individual town as the observation unit. This particular variable and the regression relationships estimated for Illinois and Iowa are

especially interesting because of the large and consistent difference in the amount of the variance of the dependent variable explained by the regression between the two states. These results are reported in Table 22.

The formulations using the logarithmic forms for the explanatory variables were consistently better than other forms that are reported here for explaining per capita sales. The distance variables are as we expected by our hypothesis, with per capita sales increasing as the distance from the nearest larger town or the distance from towns over 25,000 increases. The service area and open country area served by towns increase as distance to the nearest larger town increases. This increases the per capita sales which are calculated based on number of persons within the town itself. This is one of the limitations of the study. The open-country population served by a town is not included in the population estimate for a town. To include them some arbitrary estimation for the open-country density as well as the area serviced by a town would have to be made. So long as we note that per capita sales are based on the incorporated place population, we can interpret the results accordingly. It was decided to include population as a proxy variable for the size of town itself in order to determine whether or not the size of town had any effect upon the per capita sales. This variable was not statistically significant in Illinois when all towns over 2,500 or towns over 2,500 but less than 25,000 were included in the regression. However, it did show up as being statistically significant

Table 22. Regression results for per capita retail sales.

State	Intercept	t_2	t_3	t_4	$\log D_{mlt}$	$\log D_{25}$	$\log P$	R^2
	Places of 2,500 persons or larger							
Illinois	.92 (3.34)	.12 (1.83)	.42 (6.02)	.90 (12.85)	.34 (7.21)	.13 (4.25)	.015 (.22)	.24
Iowa	4.48 (15.74)	5.35 (.71)	.33 (4.44)	.90 (11.98)	.27 (4.28)	.11 (3.04)	.77 (11.16)	.49
	Places equal to or greater than 2,500 but less than 25,000 persons							
Illinois	1.66 (3.53)	.13 (1.66)	.44 (5.62)	.87 (11.06)	.32 (5.46)	.16 (3.71)	-.19 (1.59)	.24
Iowa	6.57 (13.29)	5.47 (.69)	.37 (4.63)	.94 (11.81)	.61 (7.20)	4.59 (1.09)	1.44 (11.08)	.52
	Places equal to or greater than 2,500 but less than 10,000 persons							
Illinois	2.20 (2.84)	.17 (1.85)	.47 (4.98)	.91 (9.47)	.57 (6.62)	.17 (2.53)	-.41 (2.03)	.29
Iowa	6.35 (8.41)	5.94 (.68)	.40 (4.57)	1.00 (11.32)	.54 (5.64)	3.82 (.82)	1.37 (6.48)	.45

in towns less than 10,000 persons. However, the sign is in the opposite direction from the sign that we would have expected. The only explanation we have for this is that in Illinois there are some towns included in this group which are suburbs of large cities and may include shopping centers frequented by many people other than those residing specifically in that town. So we believe that this negative relationship shown in Illinois in the two smaller subsets of towns is probably the shopping-center effect.

In Iowa the size of the population variable is as we would expect in all three town-size subsets, and the R^2 for the regressions in Iowa in all three town-size subsets is also about twice as large as the R^2 obtained for the regression in Illinois. This strengthens the argument that in Illinois it is the shopping-center effect of small towns in metropolitan areas which is causing this difference. This effect simply does not exist in Iowa. Those people who trade in small towns in Iowa are much more likely to be from that small town or the open country surrounding it.

IV. SUMMARY

The purpose of this report is to (1) determine the range of retail goods provided by different sizes of urban places in two predominantly different rural states, (2) to investigate the relationship of distance to larger urban places on the retail offerings of small towns, and (3) to estimate the effects of location (i.e., nearness) and town size on community viability as reflected in retail sales. A systematic approach with a much larger population than heretofore attempted has been used to determine the effects of location and size on retail trade.

Analysis of the data showed that larger urban centers played a very important role in the retail sector, especially of Illinois. Although the importance of the retail activities of the large urban-size classification is unquestionable, a role of growing relative importance for those urban-size classifications of 25,000 to 50,000 and 50,000 to 100,000 persons is indicated. Study of the data from 1954 to 1967 reveal both temporal and spatial changes in the percentage distribution of retail activity, which shows relatively greater growth for the intermediate-size classes of urban locations. The distribution of gross retail sales among towns of different sizes is very closely correlated to the population of the town. However, there is a large number of retail establishments located in small towns than the proportion of population and gross retail sales would suggest. Thus, the number of persons per establishment in small towns is much less than the number of persons per establishment in large towns. This suggests a serious

adjustment problem with respect to the number of retail businesses in small towns which can be expected to continue in business, given rising costs and the larger volume of retail sales necessary to cover overhead costs, even though overhead costs may be less in small towns. The variable costs in doing business are probably somewhat higher in larger towns where higher prices are paid for labor and other factor inputs. In many small towns businesses remain in operation so long as the opportunity cost of the proprietor's labor and the cash costs can be paid, because there may be little alternative use for the capital involved when much of the capital is tied up in buildings which may have a low market value to alternative buyers. Thus, if the value of capital is written off in businesses in small towns, these businesses can continue in operation for much longer periods of time than a cursory cost analysis might suggest. This is even more true when one recognizes that many small-town businessmen may not have many alternatives for their own time as they grow older. Thus, the adjustment problem of businesses in some of the smaller towns, which are being bypassed by consumers in their traditional service area, is acute.

The RSPI calculated for each town indicates that on the average certain functional changes are occurring over time in small towns. One of these functional changes is that in Illinois small towns there has been a progressive deterioration in the range of goods offered with respect to the expected pattern of retail sales over the whole period of observation. This has not been true in Iowa, where the RSPI has been

relatively stable for small towns and has been closer to the expected retail sales pattern. This means that small towns in Iowa have had more nearly the range and distribution of retail goods that would be expected for the average consumer. However, from the years 1963 to 1967 in Iowa, there appears also to be a deterioration in the relative sales pattern in small towns. A second factor that is noteworthy in looking at individual index values for different towns is that there are still many towns with an RSPI which approaches the expected value. In those towns where this does occur, there still is a wide range of goods being offered, and the distribution of sales is close to that expected for the average consumer.

Regression analysis lends further support to the hypothesis that the location of a town does substantially affect its pattern of retail sales when its location is related to distance from both large urban centers and nearby larger towns. Clearly, gross retail sales are larger in centers of larger population, and they are also larger for the same size town if that town is located farther from nearby larger towns and (or) larger urban centers. Also the range and relative distribution of retail sales approaches the sales pattern expected for the average consumer when a town is farther from its nearest larger neighbor and from large urban centers.

Conclusions and Recommendations

This study gives empirical evidence from a large number of observations over a period of time with regard to several hypotheses that have long been held and suggested by previous case studies.

Results of this part of the study support the hypothesis that proximity to large urban places or to larger neighboring towns will limit the retail function of small towns in the range, distribution, and gross volume of retail sales.

Leaders of different rural communities might use such information to recognize their locational advantages or disadvantages and to distinguish the differences in ability of small towns to provide viable retail services to their own residents as well as to the population of their traditional service areas. Those small towns which are close to larger neighbors or to a large urban place must recognize that in the future, to retain profitable individual businesses and to remain viable as functional communities, they may be unable to function as all-purpose retail centers. They may need to change their functions to provide residential areas and those goods and services directly related to immediate family consumption for those families obtaining employment nearby.

Likewise, all small towns may not have a declining retail sector. If a small community is located some distance from larger towns or an urban center, it may continue to service a large open country, and with some stimulation and attraction of new capital to develop employment opportunities, it may have the potential of developing into a new growth center.

This study should help in the educational efforts of leaders in rural towns to create awareness that the retail activities of any

incorporated place are significantly influenced by the activities of other urban places within its economic spatial system. And any policies undertaken by such leaders must be based on a realistic appraisal of the potential of that community, its location relative to larger neighboring towns and urban centers, and its function within the context of this total economic system.

Additional information which would be desirable to incorporate in this study would be the effect of the open country, the agricultural sales, and the purchase of agricultural inputs from all rural communities which are providing these services to the surrounding open country. An improvement which might be made over the distance variables used in this study would be to include the cost of transportation with the mileage distance from one urban place to another, since the time and cost of travel, especially with changes in the cost of energy and the approaching limitations of certain means of transportation, have an effect above and beyond the mere use of distance in miles. Also it would be desirable to look at smaller regions than whole states, as there is substantial variation with respect to the density of the agricultural open country and the size of towns from one part of a state to another.

Growth and decline of retail sales in different-size towns is a matter of relativity. Sales change from year to year, and differences from one town to another of the same size may be compared in the aggregate. For any particular community, absolute dollar sales may be rising and yet the community may be worse off, for although dollar sales may be

rising, sales may not be increasing as fast as the general rate of inflation. Where retail sales are relatively declining over time, such a community would eventually lose many of its functions. If the absolute dollar value of sales is declining, there is no question during a period of inflation that at least some parts of the retail sector are in an absolute decline. Thus community leaders must look for policies which will (1) develop new employment opportunities locally to reverse such a trend, (2) change the function of the community to a more specialized function in certain retail lines, or (3) change the function of the community to a strictly residential and service community for immediate family needs. (By immediate family needs, we mean the family consumption which is frequent, repetitive, and essential for living, such as housing, food, and gasoline.) For some communities the development of new industry to offer new job opportunities may be an alternative for the further expansion of existing industry. Development of industry, however, often has a wide spillover effect. Industrial development often benefits outlying towns within a commuting zone as much as it does the town in which the new economic activity is located. Thus, an alternative for many small communities may be to develop functions to support existing and developing new industries in nearby larger towns. These are all policy alternatives which should not be overlooked by community leaders.

As the price of gasoline increases and greater limitations on traditional highway travel are set, the Retail Sales Pattern Index might stabilize near current levels for many smaller towns. This

would arrest the decline in the range and distribution of retail sales for the intermediate and small towns. This could also bring about greater decentralization of industry and economic activity, so that industry would move closer to its labor input as well as its consumers. We also might find a greater concentration of population in towns served by main line railroads. Towns not so fortunate to be thus located may change their function to the more traditional agricultural village function of supplying and marketing inputs and products for the agricultural sector of our economy.

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APPENDIX

Table 1. Average Retail Sales in 1954.

Sales Category [b]	Population 2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000[a]	≥100,000
Illinois								
1. Lumber, Building Materials, Hardware, Farm Machinery	694.32	696.81	1317.89	2154.65	2435.70	2592.00	5305.22	63083.00
2. General Merchandise	114.82	345.76	903.31	1414.41	1779.70	6880.06	14093.22	217338.00
3. Food Store	1336.06	2348.94	4161.47	5907.47	8092.40	12550.70	24974.44	359922.30
4. Auto Dealers	968.14	1417.84	2840.36	4383.94	7097.60	11214.41	22802.66	253647.00
5. Gasoline Stations	333.18	710.62	1226.33	1495.88	1721.50	3203.53	5680.00	67889.63
6. Apparel, Accessories	135.34	336.38	1006.89	1246.47	1811.30	3512.18	9690.44	153756.60
7. Furniture Stores	110.80	303.49	658.08	877.12	1430.20	3309.00	5771.11	91760.30
8. Eating, Drinking Places	385.42	698.89	1230.25	1901.12	1947.10	4213.41	8094.22	178311.30
9. Drug Stores, Proprietary Stores	23.30	137.39	447.72	703.65	971.20	1753.12	3388.11	57855.66
10. Other Retail Stores	404.32	569.42	1359.08	1411.24	2460.80	3914.12	6648.22	156037.00
11. Nonstore Retailers	16.14	58.86	197.50	390.18	457.30	1043.59	2137.33	195188.30
Total Sales	5449.02	8936.25	16309.14	23693.29	31355.90	55932.70	111594(10	1794790.00
Number of Places in Each Group	79.00	79.00	36.00	17.00	10.00	17.00	9.00	3.00
Average Population Per Town in Each Class	3588.38	7116.78	12046.19	16791.41	22736.80	36663.94	67544.06	1269184.00
Sales Pattern Index	21.75	17.20	11.00	13.00	13.50	9.50	10.00	8.50
Iowa								
1. Lumber, Building Materials, Hardware, Farm Machinery	1453.68	1775.84	2435.75	1975.75	3002.00	3835.71	8018.40	16343.00
2. General Merchandise	298.16	830.06	1649.75	1436.00	1504.50	4973.86	17328.20	41453.00
3. Food Store	1412.76	2588.29	5009150	4985.50	7733.50	9994.29	20892.80	55543.00
4. Auto Dealers	1038.53	1982.29	3285.75	2014.25	6565.50	8674.29	19788.00	60535.00
5. Gasoline Stations	574.45	911.58	1245.75	1343.00	2254.00	2792.86	5964.80	18885.00
6. Apparel, Accessories	314.87	600.06	283.75	467.50	827.00	1800.86	5879.60	0.00
7. Furniture Stores	290.79	530.87	1022.25	893.00	1423.50	1771.29	6608.00	14524.00
8. Eating, Drinking Places	419.71	692.32	1062.25	1177.50	1758.50	2892.29	7377.20	19155.00
9. Drug Stores, Proprietary Stores	79.79	213.29	450.75	551.50	1243.50	1006.86	3816.00	10067.00
10. Other Retail Stores	794.34	1080.58	468.50	1996.50	2612.00	3061.43	9223.60	0.00
11. Nonstore Retailers	119.24	195.32	541.25	249.00	310.00	1095.86	1305.60	5791.00
Total Sales	7916.95	12634.09	20964.25	21423.25	33223.00	45852.43	108326.00	284225.00
Number of Places in Each Group	38.00	31.00	4.00	4.00	2.00	7.00	5.00	1.00
Average Population Per Town in Each Class	3642.74	6735.29	11684.25	17046.00	22719.50	33059.43	73366.75	190371.00

SOURCE: Adapted from (17).

a Towns over 50,000 population are defined as urban places.

b Sales in thousands of dollars.

Table 2. Average Retail Sales in 1958.

Sales Category [b]	Population 2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000[a]	>100,000
Illinois								
1. Lumber, Building Materials, Hardware, Farm Machinery	620.14	986.95	1205.06	1502.52	2220.70	3356.82	4594.33	60557.33
2. General Merchandise	119.34	318.02	689.12	1399.84	2854.30	6303.27	14080.00	238559.00
3. Food Store	1442.15	2577.36	4702.85	6209.16	8188.60	13496.41	27275.50	400007.00
4. Auto Dealers	888.68	1455.33	2333.42	3581.72	4770.60	9814.91	18670.16	230906.00
5. Gasoline Stations	427.18	795.91	1296.61	1844.24	1990.10	3593.27	7205.91	92492.63
6. Apparel, Accessories	214.02	487.39	1068.30	1261.76	2381.10	3119.45	7329.25	156502.60
7. Furniture Stores	145.06	337.21	822.55	852.28	1160.90	2938.09	6276.00	108273.00
8. Eating, Drinking Places	348.59	642.39	1122.52	1655.24	2740.10	3167.23	7867.75	184494.00
9. Drug Stores, Proprietary Stores	37.85	190.20	9474.00	678.72	885.70	1882.41	3393.50	70268.63
10. Other Retail Stores	499.28	607.44	1194.42	1335.96	1935.50	3580.18	8468.66	181501.00
11. Nonstore Retailers	15.18	29.39	41.06	161.84	594.10	623.86	1380.17	239942.00
Total Sales	5615.76	10065.54	17074.27	21721.20	31417.10	53642.32	115835.80	1963506.00
Number of Places in Each Group	87.00	85.00	33.00	25.00	10.00	22.00	12.00	3.00
Average Population Per Town in Each Class	3593.28	7206.06	11921.36	17227.88	22275.00	34034.77	65124.25	1263121.00
Sales Pattern Index	20.10	17.20	13.40	16.65	12.00	14.50	9.50	11.00
Iowa								
1. Lumber, Building Materials, Hardware, Farm Machinery	1660.20	1912.56	2410.83	811.00	3436.50	3624.29	6974.00	19960.00
2. General Merchandise	273.00	730.44	882.33	1631.33	0.00	4219.43	17085.50	48553.00
3. Food Store	1677.77	2990.97	4517.00	4688.66	9776.50	10658.29	24761.50	74683.00
4. Auto Dealers	1174.63	2122.19	1921.17	2772.00	5976.00	8720.43	17876.33	59634.00
5. Gasoline Stations	669.37	951.00	1461.50	1396.00	3265.00	3404.57	7567.00	24139.00
6. Apparel, Accessories	289.57	548.13	801.83	1435.67	1717.00	2914.86	7986.83	23720.00
7. Furniture Stores	242.40	439.81	548.17	1119.00	815.50	2311.29	6371.50	20125.00
8. Eating, Drinking Places	386.40	645.19	1002.50	1243.33	2059.50	2752.86	7222.16	22360.00
9. Drug Stores, Proprietary Stores	72.57	208.22	404.00	614.67	269.50	1312.14	3160.17	13270.00
10. Other Retail Stores	594.03	942.28	1574.17	1127.67	3405.00	3921.00	7856.33	26867.00
11. Nonstore Retailers	21.57	21.19	47.33	0.00	441.00	373.86	1264.17	7745.00
Total Sales	8243.17	13097.59	18597.50	19464.33	38491.00	47714.86	109281.50	341056.00
Number of Places in Each Group	34.00	32.00	6.00	3.00	2.00	7.00	6.00	1.00
Average Population Per Town in Each Class	3633.29	6785.22	11515.16	17097.00	21292.50	30723.14	73594.13	2-2778.00

SOURCE: Adapted from (18).

a Towns over 50,000 population are defined as urban places.

b Sales in thousands of dollars.

Table 3. Average Retail Sales in 1963.

Sales Category [b]	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000[a]	>100,000
				Illinois Population				
1. Lumber, Building Materials, Hardware, Farm Machinery	588.63	868.15	842.88	1464.05	2017.06	2942.04	3888.36	43964.66
2. General Merchandise	125.71	463.23	1148.39	2754.32	5681.18	7839.52	21595.71	260439.60
3. Food Store	1388.79	2709.60	4704.58	7040.27	9223.41	13394.22	25706.00	407708.00
4. Auto Dealers	1045.15	1872.36	2369.76	5282.54	5686.41	14231.70	30372.64	293043.00
5. Gasoline Stations	521.63	900.47	1302.68	2226.59	2298.24	3801.52	7260.50	90472.63
6. Apparel, Accessories	168.66	513.03	954.17	1619.55	2834.47	2952.85	9087.29	145630.60
7. Furniture Stores	331.80	344.26	565.37	622.45	1136.35	2140.93	5300.36	88085.31
8. Eating, Drinking Places	671.81	834.47	1177.88	1501.86	2379.65	3338.44	7840.43	187865.00
9. Drug Stores, Proprietary Stores	183.78	213.24	597.68	676.23	1499.24	2117.11	4620.21	81099.31
10. Other Retail Stores	634.50	824.00	1191.02	1406.77	1948.59	3133.52	7752.07	158768.30
11. Nonstore Reatilers	72.55	141.37	566.49	460.14	945.71	1367.33	2187.36	280749.60
Total Sales	5950.77	11911.76	17911.68	27297.68	29876.00	59582.89	129102.10	2037759.00
Number of Places in Each Group	111.00	87.00	41.00	22.00	17.00	27.00	14.00	3.00
Average Population Per Town in Each Class	3660.62	7277.87	12331.73	17167.59	22286.59	34247.22	65834.63	1246192.00
Sales Pattern Index	19.50	15.50	13.50	13.50	11.50	11.00	11.50	7.50
				Iowa				
1. Lumber, Building Materials, Hardware, Farm Machinery	1518.63	1861.51	1845.33	2261.50	3047.67	3691.00	6868.16	15562.00
2. General Merchandise	210.32	584.60	149.50	2771.50	2468.33	4337.86	23505.66	63687.00
3. Food Store	1624.32	3262.71	4629.66	6551.50	8057.33	12149.29	26951.83	73453.00
4. Auto Dealers	1345.22	2699.17	1742.50	2649.50	7710.66	10223.43	23118.50	74837.00
5. Gasoline Stations	798.49	1341.57	1536.50	1578.00	3503.33	3890.86	8806.66	23768.00
6. Apparel, Accessories	290.76	855.20	428.33	989.00	2257.00	2673.57	6631.33	20358.00
7. Furniture Stores	168.41	389.91	343.67	1267.50	1208.33	2985.86	5295.00	17057.00
8. Eating, Drinking Places	416.85	784.31	1083.17	1284.50	2103.33	3253.57	8240.50	23616.00
9. Drug Stores, Proprietary Stores	41.05	251.00	698.50	863.50	655.00	1683.00	4689.33	13072.00
10. Othher Retail Stores	1185.56	1551.37	1609.50	1052.50	2814.67	4305.00	7321.50	23182.00
11. Nonstore Retailers	31.61	190.23	113.83	367.00	47.00	724.29	1407.17	15352.00
Total Sales	8920.29	15430.60	18401.66	27150.00	36995.66	55463.29	124561.00	363944.00
Number of Places in Each Group	41.00	35.00	6.00	2.00	3.00	7.00	6.00	1.00
Average Population Per Town in Each Class	3568.10	6956.25	13245.83	15631.00	22921.33	32424.00	77648.13	206708.00

SOURCE: Adapted from (19).

a Towns over 50,000 population are defined as urban places.

b Sales in thousands of dollars.

Table 4. Average Retail Sales in 1967.

Sales Category [b]	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000[a]	>100,000
Illinois								
				Population				
1. Lumber, Building Materials, Hardware, Farm Machinery	672.90	983.28	1221.52	1564.11	2198.39	3259.30	5245.64	64991.33
2. General Merchandise	109.75	631.23	934.02	1692.18	2519.72	12035.70	23885.18	289857.60
3. Food Store	1500.20	3319.50	5262.59	7742.43	10319.61	16494.96	32255.35	465347.00
4. Auto Dealers	1047.93	1858.38	3001.05	4803.14	6430.22	15807.73	34496.53	320350.60
5. Gasoline Stations	667.39	1191.39	1613.86	2727.18	3094.33	4834.40	9052.47	110701.00
6. Apparel, Accessories	357.12	573.60	945.60	1553.14	1971.11	4738.96	10320.35	189712.00
7. Furniture Stores	171.05	434.12	924.86	1104.54	1621.61	5099.16	7683.94	122045.60
8. Eating, Drinking Places	582.97	870.77	1975.74	2033.21	3375.72	4788.16	10412.06	234118.00
9. Drug Stores, Proprietary Stores	40.77	241.42	576.45	1132.32	1684.39	3144.37	5831.47	97518.31
10. Other Retail Stores	633.57	877.93	1042.48	1854.82	2908.83	4710.66	8927.06	151544.30
11. Nonstore Retailers	25.54	62.82	360.43	358.21	569.50	1476.23	3503.88	267415.00
Total Sales	8644.43	14137.36	23872.05	31374.93	41838.50	80150.69	158328.80	2395988.00
Number of Places in Each Group	114.00	90.00	42.00	28.00	18.00	30.00	17.00	3.00
Average Population Per Town in Each Class	3685.76	7288.14	12183.71	17392.68	22266.89	34150.46	64772.18	1227661.00
Sales Pattern Index	22.20	15.30	14.00	12.50	12.00	9.00	9.50	10.50
Iowa								
1. Lumber, Building Materials, Hardware, Farm Machinery	2049.05	2546.94	1723.75	1948.00	3595.00	4800.00	8044.20	16748.00
2. General Merchandise	272.86	852.71	0.00	1596.00	3299.00	8956.11	31007.00	73356.50
3. Food Store	1634.67	3733.20	4852.00	7710.60	10936.00	15321.66	30864.80	68126.00
4. Auto Dealers	1470.69	2271.40	3160.75	4630.80	8666.00	13112.11	26731.6-	58855.00
5. Gasoline Stations	867.81	1581.51	1657.75	2156.80	4180.00	4922.33	10395.00	23464.50
6. Apparel, Accessories	273.74	669.86	322.50	1325.40	0.00	1615.44	6976.20	18534.50
7. Furniture Stores	213.90	540.89	935.75	961.40	2750.00	3493.78	5646.60	18391.00
8. Eating, Drinking Places	499.31	1009.14	925.25	1854.00	2365.00	4617.55	10485.40	24752.00
9. Drug Stores, Proprietary Stores	74.33	295.91	289.50	703.20	1784.00	1421.22	6776.20	12003.00
10. Other Retail Stores	1421.95	2523.83	2281.00	1333.40	4521.00	5675.33	9656.20	19173.00
11. Nonstore Reailers	50.19	130.54	629.50	372.00	0.00	681.00	2034.40	11208.50
Total Sales	10986.33	19977.08	26514.50	28457.80	46195.00	71091.06	150509.50	344612.00
Number of Places in Each Group	42.00	35.00	4.00	5.00	1.00	9.00	5.00	2.00
Average Population Per Town in Each Class	3621.29	7083.88	12465.25	16121.60	21982.00	32142.00	75289.75	154369.00

SOURCE: Adapted from (20).
a Towns over 50,000 population are defined as urban places.
b Sales in thousands of dollars.

Table 5. Percent of Retail Sales in 1954.

Sales Category	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
Illinois								
				Population				
1. Lumber, Building Materials, Hardware, Farm Machinery	10.31	13.61	8.91	6.88	4.58	11.47	8.97	35.56
2. General Merchandise	0.90	2.71	3.23	2.39	1.77	11.62	12.60	64.78
3. Food Store	4.98	8.67	7.00	4.69	3.78	9.97	10.50	50.45
4. Auto Dealers	4.80	7.03	6.42	4.65	4.46	11.97	12.88	47.77
5. Gasoline Stations	6.27	11.64	9.15	5.27	3.57	11.29	10.60	42.22
6. Apparel, Accessories	1.48	3.69	5.03	2.94	2.51	8.28	12.10	63.98
7. Furniture Stores	2.01	5.10	5.04	3.17	3.04	11.97	11.06	58.59
8. Eating, Drinking Places	3.54	6.41	5.14	3.75	2.26	8.32	8.46	62.12
9. Drug Stores, Proprietary Stores	0.79	3.81	5.66	4.20	3.41	10.47	10.71	60.96
10. Other Retail Stores	4.16	5.76	6.37	3.12	3.20	8.66	7.79	60.93
11. Nonstore Retailers	0.20	0.72	1.10	1.03	0.71	2.74	2.97	90.53
Total Sales	4.40	7.22	6.00	4.12	3.21	9.72	10.27	55.06
Number of Places in Each Group	79	79	36	17	10	17	9	3
Percent of Population in Each Group	4.15	8.23	6.35	4.18	3.33	9.12	8.90	55.74
Iowa								
1. Lumber, Building Materials, Hardware, Farm Machinery	25.43	25.34	4.49	3.64	2.76	12.36	18.46	7.52
2. General Merchandise	5.26	11.95	3.06	2.67	1.40	16.17	40.24	19.25
3. Food Store	12.80	19.13	4.78	4.76	3.69	16.68	24.91	13.25
4. Auto Dealers	11.10	17.29	3.70	2.27	3.69	17.08	27.84	17.03
5. Gasoline Stations	16.39	21.21	3.74	4.03	3.38	14.68	22.39	14.18
6. Apparel, Accessories	15.49	24.09	1.47	2.42	2.14	16.32	38.07	0.00
7. Furniture Stores	11.28	16.80	4.17	3.65	2.91	12.64	33.72	14.82
8. Eating, Drinking Places	12.64	17.01	3.37	3.73	2.79	16.05	29.23	15.18
9. Drug Store, Proprietary Stores	5.79	12.63	3.45	4.22	4.75	13.47	36.46	19.24
10. Other Retail Stores	18.73	23.44	1.31	5.59	3.66	15.00	32.27	0.00
11. Nonstore Retailers	13.19	17.62	6.30	2.90	1.80	22.33	19.00	16.86
Total Sales	14.50	18.87	4.04	4.13	3.20	15.47	26.10	13.70
Number of Places in Each Group	38	31	4	4	2	7	5	1
Percent of Population in Each Group	10.68	16.11	3.61	5.26	3.51	16.85	28.30	14.69

SOURCE: Adapted from (17).

Table 6.. Percent of Retail Sales in 1958.

Sales Category	Illinois Population 2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
1. Lumber, Building Materials, Hardware, Farm Machinery	9.84	15.31	7.26	6.85	4.05	13.48	10.06	33.15
2. General Merchandise	0.91	2.36	1.98	3.05	2.49	12.09	14.73	62.40
3. Food Store	4.90	8.55	6.06	6.06	3.20	11.59	12.78	46.86
4. Auto Dealers	5.01	8.01	4.77	5.80	3.09	13.98	14.50	44.85
5. Gasoline Stations	5.66	10.30	6.52	7.02	3.03	12.04	13.17	42.26
6. Apparel, Accessories	2.40	5.33	4.54	4.06	3.07	8.84	11.32	60.45
7. Furniture Stores	2.23	5.06	4.79	3.76	2.05	11.42	13.30	57.38
8. Eating, Drinking Places	3.34	6.01	4.08	4.56	3.02	7.67	10.39	60.93
9. Drug Stores, Proprietary Stores	0.51	2.48	48.03	2.61	1.36	6.36	6.26	32.39
10. Other Retail Stores	4.76	5.66	4.32	3.66	2.12	8.64	11.14	59.70
11. Nonstore Retailers	0.17	0.33	0.18	0.53	0.78	1.79	2.16	94.06
Total Sales	4.35	7.62	5.02	4.84	2.80	10.51	12.38	52.47
Number of Places in Each Group	87	85	33	25	10	22	12	3
Percent of Population in Each Group	4.29	8.40	5.40	5.91	3.05	10.27	10.72	51.97
	Iowa							
1. Lumber, Building Materials, Hardware, Farm Machinery	25.24	26.58	6.28	1.06	2.98	11.02	18.17	8.67
2. General Merchandise	4.27	10.45	2.37	2.19	0.00	13.20	45.82	21.70
3. Food Store	11.45	18.66	5.28	2.74	3.81	14.54	28.96	14.56
4. Auto Dealers	11.15	18.42	3.13	2.26	3.24	16.55	29.09	16.17
5. Gasoline Stations	14.05	18.25	5.26	2.51	3.92	14.29	27.23	14.48
6. Apparel, Accessories	7.66	13.26	3.64	3.26	2.60	15.43	36.23	17.93
7. Furniture Stores	8,05	13.36	3.12	3.19	1.55	15.35	36.28	19.10
8. Eating, Drinking Places	10.17	15.52	4.52	2.80	3.10	14.49	32.58	16.81
9. Drug Stores, Proprietary Stores	4.58	12.02	4.37	3.33	0.97	16.57	34.21	23.94
10. Other Retail Stores	12.09	17.53	5.49	1.97	3.96	15.95	27.40	15.62
11. Nonstore Retailers	3.68	3.30	1.35	0.00	4.29	12.74	36.93	37.71
Total Sales	12.62	18.34	4.88	2.56	3.37	14.62	28.69	14.92
Number of Places in Each Group	35	32	6	3	2	7	6	1
Percent of Population in Each Group	9.30	15.89	5.06	3.75	3.12	15.74	32.31	14.84

SOURCE: Adapted from (18).

Table 7. Percent of Retail Sales in 1963.

Sales Category	Population 2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	<100,000
Illinois								
1. Lumber, Building Materials, Hardware, Farm Machinery	12.88	14.89	6.81	6.35	6.76	15.66	19.73	25.94
2. General Merchandise	0.90	2.59	3.03	3.90	6.22	13.62	19.46	50.28
3. Food Store	5.43	8.30	6.79	5.46	5.52	12.74	12.68	13.08
4. Auto Dealers	5.09	7.15	4.27	5.10	4.24	16.87	18.67	38.60
5. Gasoline Stations	7.69	10.40	7.09	6.40	5.10	13.62	13.49	36.03
6. Apparel, Accessories	2.26	5.38	4.71	4.29	5.80	9.60	15.33	52.63
7. Furniture Stores	7.10	5.61	4.47	2.64	3.73	11.15	14.32	90.98
8. Eating, Drinking Places	7.19	7.42	4.66	3.19	3.90	8.69	10.49	94.36
9. Drug Stores, Proprietary Stores	4.35	3.96	5.23	3.17	5.43	12.19	13.79	51.88
10. Other Retail Stores	8.71	7.66	5.22	3.31	3.54	9.04	11.60	50.91
11. Nonstore Retailers	0.83	1.26	1.96	1.04	1.65	3.78	3.14	86.34
Total Sales	4.99	7.83	5.55	4.54	5.12	12.15	13.65	46.18
Number of Places in Each Group	111	87	41	22	17	27	14	3
Percent of Population in Each Group	5.15	8.03	6.41	4.79	4.80	11.72	11.69	47.00
Iowa								
1. Lumber, Building Materials, Hardware, Farm Machinery	26.52	27.75	4.72	1.93	3.89	11.01	17.55	6.63
2. General Merchandise	3.10	7.36	0.32	1.99	2.66	10.92	50.73	22.91
3. Food Store	12.40	20.03	4.87	2.30	4.24	14.92	28.36	12.88
4. Auto Dealers	11.64	19.95	2.21	1.12	4.88	15.11	29.29	15.80
5. Gasoline Stations	14.33	23.16	4.55	1.56	5.18	13.43	26.06	11.72
6. Apparel, Accessories	9.03	22.67	1.95	1.50	5.13	14.17	30.13	15.42
7. Furniture Store	7.01	13.85	2.09	2.57	3.68	21.22	32.25	17.32
8. Eating, Drinking Places	10.97	17.62	4.17	1.65	4.05	14.62	31.74	15.16
9. Drug Stores, Proprietary Stores	2.34	12.19	5.82	2.40	2.73	17.33	39.06	18.15
10. Other Retail Stores	22.68	25.33	4.51	0.98	3.94	14.06	17.69	10.81
11. Nonstore Retailers	3.46	17.77	1.82	1.42	0.38	11.66	22.53	40.96
Total Sales	13.64	20.14	4.12	2.03	4.14	14.48	27.88	13.57
Number of Places in Each Group	41	35	6	2	3	7	6	1
Percent of Population in Each Group	9.96	16.58	5.41	2.73	4.68	15.45	31.72	14.07

SOURCE: Adapted from (19).

Table 8. Percent of Retail Sales in 1967.

Sales Category	Population 2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
Illinois								
1. Lumber, Building Materials, Hardware, Farm Machinery	11.25	12.98	7.52	6.42	5.80	14.34	13.08	28.60
2. General Merchandise	0.59	2.66	1.83	2.22	2.12	16.89	18.00	54.70
3. Food Store	4.88	8.46	6.26	6.14	5.26	14.01	15.52	39.52
4. Auto Dealers	4.45	6.23	4.69	5.01	4.31	17.66	21.84	35.80
5. Gasoline Stations	7.50	10.57	6.68	7.53	5.49	14.30	15.17	32.75
6. Apparel, Accessories	2.70	4.75	3.66	4.00	3.27	13.09	16.15	52.39
7. Furniture Stores	2.42	4.84	4.81	3.83	3.62	18.95	16.18	45.35
8. Eating, Drinking Places	4.86	5.73	6.06	4.16	4.44	10.50	12.93	51.32
9. Drug Stores, Proprietary Stores	0.78	3.63	4.04	5.30	5.06	15.76	16.56	48.87
10. Other Retail Stores	6.90	7.55	4.18	4.96	5.00	13.50	14.49	43.42
11. Nonstore Reatilers	0.31	0.59	1.59	1.06	1.10	4.66	6.27	84.42
Total Sales	5.74	7.41	5.84	4.11	4.38	14.00	15.67	41.83
Number of Places in Each Group	114	90	42	28	18	30	17	3
Percent of Population in Each Group	5.07	7.92	6.18	5.88	4.84	12.37	13.29	44.46
Iowa								
1. Lumber, Building Materials, Hardware, Farm Machinery	27.55	28.54	2.21	3.12	1.15	13.83	12.88	10.72
2. General Merchandise	2.63	6.86	0.00	1.83	0.76	18.53	35.65	33.73
3. Food Store	10.39	18.64	2.77	5.50	1.56	19.67	22.02	19.44
4. Auto Dealers	11.13	14.32	2.28	4.17	1.56	21.26	24.08	21.20
5. Gasoline Stations	14.20	21.57	2.58	4.20	1.63	17.26	20.26	18.29
6. Apparel, Accessories	8.89	18.13	1.00	5.12	0.00	11.24	26.97	28.66
7. Furniture Stores	6.62	13.95	2.76	3.54	2.03	23.18	20.81	27.11
8. Eating, Drinking Places	9.75	16.42	1.72	4.31	1.10	19.32	24.37	23.01
9. Drug Stores, Proprietary Stores	3.50	10.11	1.30	3.94	2.00	14.33	37.95	26.89
10. Other Retail Stores	19.51	28.86	2.98	2.18	1.48	16.69	15.77	12.53
11. Nonstore Retailers	4.24	9.18	5.06	3.74	0.00	12.31	20.44	45.04
Total Sales	13.05	19.77	3.00	4.02	1.31	18.09	21.28	19.49
Number of Places in Each Group	42	35	4	5	1	9	5	2
Percent of Population in Each Group	9.96	16.24	3.27	5.28	1.44	18.94	24.65	20.22

SOURCE: Adapted from (20).

Table 9. Average Number of Establishments in 1954.

Sales Category	Population 2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
Illinois								
1. Lumber, Building Materials, Hardware, Farm Machinery	6.43	7.71	9.22	12.50	13.70	19.71	37.00	497.33
2. General Merchandise	2.42	3.35	5.11	5.00	5.00	11.64	20.33	344.33
3. Food Store	11.78	18.95	26.72	25.24	29.40	83.06	179.33	3283.33
4. Auto Dealers	5.29	6.65	9.28	11.35	15.90	26.47	37.00	359.00
5. Gasoline Stations	7.19	10.44	16.44	20.76	22.20	45.53	75.78	699.33
6. Apparel, Accessories	4.13	6.75	12.61	15.41	21.20	38.29	16.00	1342.33
7. Furniture Stores	3163	5.85	7.81	10.94	14.40	27.94	45.56	607.00
8. Eating, Drinking Places	12.38	19.13	28.44	48.41	39.70	100.29	182.44	3219.00
9. Drug Stores, Proprietary Stores	1.87	2.73	4.28	5.29	5.70	13.24	28.56	522.00
10. Other Retail Stores	8.18	11.14	20.19	25.00	33.40	6-.35	114.89	1983.64
11. Nonstore Retailers	2.19	4.18	8.14	9.33	11.20	23.76	42.33	820.00
Total Establishments	65.49	96.87	148.25	200.35	222.80	449.24	835.22	13677.66
Number of Places in Each Group	79	79	36	17	10	17	9	3
Average Population Per Town in Each Class	3588.28	7116.78	12046.19	16791.41	22736.80	36663.94	67544.06	1269184.00
Iowa								
1. Lumber, Building Materials, Hardware, Farm Machinery	12.58	15.03	17.25	18.50	20.00	25.86	40.80	109.00
2. General Merchandise	3.47	5.35	6.50	6.50	11.00	11.43	15.8-	43.00
3. Food Store	11.18	16.03	30.75	47.00	39.50	73.86	159.60	422.00
4. Auto Dealers	7.08	9.81	13.50	16.00	18.50	22.14	43.00	123.00
5. Gasoline Stations	10.82	16.32	25.00	24.00	29.50	43.86	89.00	254.00
6. Apparel, Accessories	6.79	10.48	18.00	18.74	27.00	32.43	57.60	138.00
7. Furniture Stores	5.74	10.13	14.25	15.25	18.00	24.57	51.80	35.00
8. Eating, Drinking Places	14.87	21.48	34.25	41.75	51.00	84.71	192.40	465.00
9. Drug Stores, Proprietary Stores	2.58	3.65	6.50	6.50	9.50	11.71	28.20	100.00
10. Other Retail Stores	11.82	18.10	27.50	30.25	41.00	55.29	111.00	276.00
11. Nonstore Retailers	5.68	9.13	14.25	11.50	12.00	26.14	57.60	188.00
Total	91.39	135.06	203.75	236.00	277.00	406.43	846.80	2263.00
Number of Places in Each Group	38	31	4	4	2	7	5	1
Average Population Per Town in Each Class	3642.74	6735.29	11684.25	17046.00	22719.50	33059.43	73366.75	190371.00

SOURCE: Adapted from (17).

Table 10. Average Number of Establishments in 1958.

Sales Category	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
Illinois								
				Population				
1. Lumber, Building Materials, Hardware, Farm Machinery	5.74	7.87	7.36	10.48	15.50	19.50	33.42	500.00
2. General Merchandise	2.28	3.05	3.85	5.16	6.90	9.68	20.17	342.00
3. Food Store	9.47	14.38	20.42	24.68	29.20	51.82	123.67	2721.33
4. Auto Dealers	4.11	6.24	7.85	10.24	8.20	22.05	36.17	336.33
5. Gasoline Stations	6.86	10.34	13.52	19.12	21.00	42.41	74.50	824.67
6. Apparel, Accessories	4.17	7.47	11.21	13.44	17.10	30.05	58.42	1204.33
7. Furniture Stores	3.64	5.80	9.24	10.80	13.60	23.82	46.17	667.00
8. Eating, Drinking Places	11.78	16.92	23.30	35.80	39.30	70.50	156.33	3175.33
9. Drug Stores, Proprietary Stores	1.82	2.66	34.12	4.64	6.20	10.50	23.58	491.00
10. Other Retail Stores	7.37	11.09	16.94	22.12	24.70	48.77	97.08	1927.67
11. Nonstore Retailers	1.65	2.84	3.82	6.64	8.90	15.64	31.42	660.33
Total Establishments	48.99	88.64	121.42	163.12	190.60	344.73	700.92	12850.00
Number of Places in Each Group	87	85	33	25	10	22	12	3
Average Population Per Town in Each Class	3593.28	7206.06	11921.36	17227.88	22275.00	34034.77	65124.25	1263121.00
Iowa								
1. Lumber, Building Materials, Hardware, Farm Machinery	11.11	13.75	14.50	14.00	22.00	22.71	38.17	26.00
2. General Merchandise	3.71	5.06	4.50	7.33	9.00	11.29	14.67	67.00
3. Food Store	8.03	13.22	18.00	31.33	47.50	50.57	108.83	375.00
4. Auto Dealers	6.09	9.00	10.67	14.67	14.00	21.43	32.00	119.00
5. Gasoline Stations	10.06	14.16	20.00	20.33	32.50	45.86	87.00	327.00
6. Apparel, Accessories	6.80	10.63	13.67	18.00	23.50	27.86	43.83	138.00
7. Furniture Stores	5.26	9.34	11.50	16.00	22.00	28.71	42.00	155.00
8. Eating, Drinking Places	12.69	18.38	28.50	40.33	52.50	70.43	159.17	510.00
9. Drug Stores, Proprietary Stores	2.20	3.50	5.00	5.33	7.00	9.29	22.17	90.00
10. Other Retail Stores	9.74	15.94	22.00	28.00	36.00	47.43	103.33	262.00
11. Nonstore Retailers	1.97	3.91	6.17	7.67	11.50	11.71	33.33	157.00
Total	77.74	117.09	154.50	203.00	277.50	347.29	684.50	2326.00
Number of Places in Each Group	35	32	6	3	2	7	6	1
Average Population Per Town in Each Class	3633.29	6785.22	11515.16	17097.00	21292.50	30723.14	73594.13	202778.00

SOURCE: Adapted from (18).

Table 11. Average Number of Establishments in 1963.

Sales Category	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
Illinois								
				Population				
1. Lumber, Building Materials, Hardware, Farm Machinery	5.02	6.84	6.15	10.77	9.59	16.63	36.71	367.00
2. General Merchandise	2.10	3.23	3.76	6.64	5.71	9.37	19.00	264.67
3. Food Store	7.37	12.30	15.78	22.55	22.76	40.15	89.36	2096.33
4. Auto Dealers	3.78	6.69	6.05	10.77	9.00	18.59	36.71	384.00
5. Gasoline Stations	6.86	10.67	13.56	22.23	19.47	36.30	69.36	721.33
6. Apparel, Accessories	3.72	6.51	8.95	15.00	15.53	23.89	59.11	1000.00
7. Furniture Stores	3.96	5.54	7.00	8.18	8.61	19.00	33.64	510.00
8. Eating, Drinking Places	15.12	17.34	21.02	25.77	29.53	58.78	125.36	2849.67
9. Drug Stores, Proprietary Stores	2.24	2.61	3.49	4.41	5.47	8.41	21.57	437.33
10. Other Retail Stores	9.69	12.02	16.68	19.18	21.82	38.89	84.14	1633.67
11. Nonstore Retailers	2.47	4.10	62.0	7.32	10.88	14.96	31.50	555.67
Total Establishments	53.02	86.14	107.56	162.41	169.76	292.93	613.00	10719.66
Number of Places in Each Group	111	86	41	11	17	27	14	3
Average Population Per Town in Each Class	3660.62	7277.87	12331.73	17167.59	22286.59	34247.22	65834.63	1246192.00
Iowa								
1. Lumber, Building Materials, Hardware, Farm Machinery	9.76	12.60	12.50	12.00	20.00	19.57	31.50	105.00
2. General Merchandise	3.05	4.89	4.83	6.50	9.00	9.86	18.67	40.00
3. Food Store	6.78	10.26	15.83	15.50	32.00	38.29	93.33	225.00
4. Auto Dealers	5.02	8.31	8.17	10.50	19.00	19.71	37.17	113.00
5. Gasoline Stations	9.80	16.57	19.50	17.00	38.67	44.29	91.67	267.00
6. Apparel, Accessories	6.20	10.00	10.83	17.00	20.67	24.71	46.00	111.00
7. Furniture Stores	4.46	7.09	7.83	18.50	14.00	27.14	41.50	119.00
8. Eating, Drinking Places	11.80	18.74	22.83	33.00	48.00	64.43	153.50	412.00
9. Drug Stores, Proprietary Stores	2.17	3.23	4.50	4.50	6.33	9.71	23.00	78.00
10. Other Retail Stores	11.20	18.23	18.17	23.50	43.33	49.71	102.00	258.00
11. Nonstore Retailers	3.24	5.26	7.17	5.50	15.67	15.71	40.50	127.00
Total Sales	73.49	115.17	132.17	163.50	266.67	323.14	678.83	1855.00
Number of Places In Each Group	41	35	6	2	3	7	6	1
Average Population Per Town in Each Class	3568.10	6956.25	13245.83	15631.00	22921.33	32424.00	77648.13	206708.00

SOURCE: Adapted from (19).

Table 12. Average Number of Establishments in 1967.

Sales Category	Illinois Population 2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
1. Lumber, Building Materials, Hardware, Farm Machinery	4.20	5.59	5.48	7.64	7.78	13.57	23.06	326.67
2. General Merchandise	2.28	-3.59	4.24	-6.64	-6.64	10.47	19.47	304.33
3. Food Stores	6.21	10.24	13.12	18.00	19.89	35.80	74.24	1650.67
4. Auto Dealers	3.65	5.79	6.14	8.07	8.61	17.90	31.76	283.00
5. Gasoline Stations	6.39	10.80	12.79	18.36	18.67	33.93	61.75	702.67
6. Apparel, Accessories	3.16	5.76	7.24	11.57	11.78	23.77	43.76	901.33
7. Furniture Stores	2.97	4.94	6.10	8.82	10.50	20.78	37.94	488.67
8. Eating, Drinking Places	11.15	16.36	22.74	31.21	33.06	60.63	131.41	2801.67
9. Drug Stores, Proprietary Stores	1.69	2.44	3.38	4.68	5.06	9.37	21.24	388.67
10. Other Retail Stores	7.76	-12.02	16.45	23.82	24.89	47.90	89.18	1617.00
11. Nonstore Retailers	2.13	-4.30	6.19	8.86	12.11	18.60	33.90	458.67
Total Establishments	51.50	81.83	103.86	148.68	158.78	292.37	567.71	9856.33
Number of Places in Each Group	114	90	42	28	18	30	17	3
Average Population Per Town in Each Class	3685.76	7288.14	12183.71	17394.68	22266.89	34150.46	64772.18	1227661.00

Sales Category	Iowa 2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
1. Lumber, Building Materials, Hardware, Farm Machinery	9.12	11.83	11.75	8.80	16.00	19.11	31.00	64.00
2. General Merchandise	3.69	6.74	5.75	6.80	12.00	13.56	21.60	48.50
3. Food Stores	6.29	9.26	12.25	16.00	37.00	34.22	77.80	139.50
4. Auto Dealers	5.50	8.20	13.75	8.40	19.00	23.56	36.80	79.00
5. Gasoline Stations	9.31	15.31	18.00	20.20	33.00	41.89	83.40	205.00
6. Apparel, Accessories	5.62	9.74	10.50	10.40	19.00	24.89	36.60	85.00
7. Furniture Stores	4.76	8.23	9.25	10.60	20.00	25.00	36.00	94.00
8. Eating, Drinking Places	11.98	19.49	24.00	24.40	54.00	67.89	148.60	312.50
9. Drug Stores, Proprietary Stores	2.76	3.51	5.00	4.40	7.00	9.11	21.20	47.50
10. Other Retail Stores	11.81	21.54	25.75	23.60	39.00	55.44	108.20	207.00
11. Nonstore Retailers	3.86	5.89	12.50	10.00	8.00	18.44	45.60	109.50
Total	74.02	119.74	148.50	143.60	264.00	333.11	646.80	1391.50
Number of Places in Each Group	42	35	4	5	1	9	5	2
Average Population Per Town in Each Class	3621.29	7083.88	12465.25	16121.60	21982.00	32142.00	75289.75	154368.00

SOURCE: Adapted from (20).

Table 13. Percent of Establishments in 1954.

Sales Category	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
				Illinois				
				Population				
1. Lumber, Building Materials, Hardware, Farm Machinery	12.83	15.38	8.38	5.40	3.46	8.46	8.41	37.60
2. General Merchandise	8.62	11.96	8.30	4.60	2.71	8.94	8.26	46.62
3. Food Stores	5.39	8.67	5.57	3.47	2.28	8.18	9.33	57.07
4. Auto Dealers	11.98	15.05	9.57	5.53	4.57	12.90	9.54	30.87
5. Gasoline Stations	9.29	13.49	9.68	5.77	3.63	12.66	11.15	34.31
6. Apparel, Accessories	4.58	7.49	6.38	3.68	2.98	9.15	9.11	56.61
7. Furniture Stores	7.09	11.41	6.94	4.59	3.56	11.31	10.13	44.97
8. Eating, Drinking Places	5.51	8.52	5.77	4.64	2.24	9.61	9.26	54.45
9. Drug Stores, Proprietary Stores	5.46	7.96	5.68	3.32	2.10	8.29	9.47	57.72
10. Other Retail Stores	5.86	7.98	6.60	3.86	3.03	9.31	9.38	53.99
11. Nonstore Retailers	4.01	7.65	6.79	3.69	2.60	9.37	8.84	57.05
Total Establishments	6.47	9.57	6.67	4.26	2.79	9.55	9.40	51.30
Number of Places in Each Group	79	79	36	17	10	17	9	3
Percent of Population in Each Group	4.15	8.23	6.35	4.18	3.33	9.12	8.90	55.74
				Iowa				
1. Lumber, Building Materials, Hardware, Farm Machinery	29.49	28.75	4.26	4.57	2.47	11.17	12.58	6.72
2. General Merchandise	23.00	28.92	4.53	4.53	3.83	13.94	13.76	7.49
3. Food Stores	13.80	17.14	3.99	6.10	2.56	16.79	25.91	13.70
4. Auto Dealers	22.03	24.90	4.42	5.24	3.03	12.69	17.61	10.07
5. Gasoline Stations	18.87	23.23	4.59	4.41	2.71	14.10	20.43	11.66
6. Apparel, Accessories	17.95	22.62	5.01	5.22	3.76	15.80	20.04	9.60
7. Furniture Stores	18.92	27.26	4.95	5.30	3.13	14.93	22.48	3.40
8. Eating, Drinking Places	15.41	18.16	3.74	4.55	2.78	16.17	26.23	12.95
9. Drug Stores, Proprietary Stores	16.20	18.68	4.30	4.30	3.14	13.55	23.31	16.53
10. Other Retail Stores	17.67	22.08	4.33	4.76	3.23	15.23	21.84	10.86
11. Nonstore Retailers	16.81	22.02	4.44	3.58	1.87	14.24	22.41	14.63
Total	17.98	21.68	4.22	4.89	2.87	14.73	21.92	11.72
Number of Places in Each Group	38	31	4	4	2	7	5	1
Percent of Population in Each Group	10.68	16.11	3.61	5.26	3.51	17.85	28.30	14.69

SOURCE: Adapted from (18).

Table 14. Percent of Establishments in 1958.

Sales Category	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
Illinois								
				Population				
1. Lumber, Building Materials, Hardware, Farm Machinery	12.00	16.09	5.84	6.30	3.73	10.32	9.64	36.08
2. General Merchandise	8.75	11.44	5.61	5.70	3.05	9.41	10.69	45.34
3. Food Stores	5.72	8.48	4.68	4.28	2.03	7.91	10.29	56.63
4. Auto Dealers	10.49	15.53	7.59	7.50	2.40	14.21	12.72	29.56
5. Gasoline Stations	8.64	12.72	6.45	6.92	3.04	13.50	21.94	35.80
6. Apparel, Accessories	5.30	9.2	5.40	4.91	2.50	9.64	10.23	52.74
7. Furniture Stores	6.89	10.72	6.63	5.87	2.96	11.39	12.04	43.50
8. Eating, Drinking Places	5.87	8.23	4.40	5.12	2.25	8.88	10.74	54.52
9. Drug Stores, Proprietary Stores	4.30	6.15	30.64	3.16	1.69	6.29	7.70	40.08
10. Other Retail Stores	5.85	8.60	5.10	5.04	2.25	9.79	10.63	52.75
11. Nonstore Retailers	4.37	6.93	3.62	4.78	2.56	9.90	10.85	56.99
Total Establishments	6.65	9.76	5.19	5.28	2.47	9.82	10.89	49.93
Number of Places in Each Group	87	85	33	25	10	22	12	3
Percent of Population in Each Group	4.29	8.40	5.40	5.81	3.05	10.27	10.72	51.97
Iowa								
1. Lumber, Building Materials, Hardware, Farm Machinery	27.47	31.07	5.14	2.97	3.11	11.23	16.17	1.84
2. General Merchandise	21.92	27.32	4.55	3.71	3.04	13.32	14.84	11.30
3. Food Stores	11.79	17.75	4.53	3.94	3.99	14.86	27.40	15.74
4. Auto Dealers	19.40	26.23	5.83	4.01	2.55	13.66	17.49	10.84
5. Gasoline Stations	15.85	20.40	5.40	2.75	2.93	14.45	23.50	14.72
6. Apparel, Accessories	17.54	25.06	6.04	3.98	3.46	14.37	19.38	10.17
7. Furniture Stores	14.70	23.88	5.51	3.83	3.51	16.05	20.13	12.38
8. Eating, Drinking Places	13.11	17.36	5.05	3.57	3.10	14.56	28.20	15.06
9. Drug Stores, Proprietary Stores	14.73	21.18	5.52	2.95	2.58	11.97	24.49	16.57
10. Other Retail Stores	14.49	21.67	5.61	3.57	3.06	14.11	27.35	11.13
11. Nonstore Retailers	9.64	17.46	5.17	3.21	3.21	11.45	27.93	21.93
Total	15,62	21.51	5.32	3.50	3.19	13.95	23.57	13.35
Number of Places in Each Group	35	32	7	3	2	7	6	1
Percent of Population in Each Group	9.30	15.89	5.06	3.75	3.12	15.74	32.31	14.84

SOURCE: Adapted from (18).

Table 15. Percent of Establishments in 1963.

Sales Category	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
				Illinois				
				Population				
1. Lumber, Building Materials, Hardware, Farm Machinery	15.01	16.03	6.79	6.39	3.93	12.10	10.88	29.67
2. General Merchandise	10.48	12.63	6.82	6.56	4.36	11.38	11.96	35.70
3. Food Stores	6.79	8.89	5.37	4.12	3.21	9.00	10.39	52.23
4. Auto Dealers	11.97	16.59	7.07	6.76	4.36	14.31	14.65	24.29
5. Gasoline Stations	10.61	12.92	7.74	6.81	4.61	13.75	13.52	30.14
6. Apparel, Accessories	6.58	9.01	5.84	5.25	4.20	10.27	11.08	47.76
7. Furniture Stores	10.86	11.90	7.08	4.44	3.65	12.66	11.63	37.77
8. Eating, Drinking Places	8.87	8.87	5.07	3.33	2.85	9.33	10.32	50.26
9. Drug Stores, Proprietary Stores	9.40	8.57	5.40	3.66	3.51	8.57	11.40	49.51
10. Other Retail Stores	10.03	9.75	6.38	3.93	3.46	9.79	10.98	45.68
11. Nonstore Retailers	7.32	9.54	6.79	4.30	4.94	10.79	11.78	44.54
Total Establishments	8.07	10.28	6.05	4.90	3.96	10.85	11.77	44.12
Number of Places in Each Group	111	87	41	22	17	27	14	3
Percent of Population in Each Group	5.15	8.03	6.41	4.79	4.80	11.72	11.69	47.00
				Iowa				
1. Lumber, Building Materials, Hardware, Farm Machinery	27.95	30.82	5.24	1.68	4.19	9.57	13.21	7.34
2. General Merchandise	21.33	29.18	4.95	2.22	4.61	11.77	19.11	6.83
3. Food Stores	14.54	18.78	4.97	1.62	5.02	14.02	29.29	11.77
4. Auto Dealers	18.76	27.5-	4.46	1.91	5.19	12.57	20.31	10.29
5. Gasoline Stations	16.92	24.41	4.92	1.43	4.88	13.05	23.15	11.24
6. Apparel, Accessories	19.17	26.42	4.91	2.57	4.68	13.06	20.83	8.38
7. Furniture Stores	16.41	22.24	4.22	3.32	3.77	17.04	22.33	10.67
8. Eating, Drinking Places	14.80	20.06	4.19	2.02	4.40	13.79	28.16	12.60
9. Drug Stores, Proprietary Stores	16.45	20.89	4.99	1.66	3.51	12.57	25.51	14.42
10. Other Retail Stores	17.65	24.53	4.19	1.81	5.00	13.38	23.53	9.92
11. Nonstore Retailers	14.81	20.49	4.79	1.22	5.23	12.25	27.06	14.14
Total	17.56	23.50	4.62	1.91	4.66	13.19	23.74	10.81
Number of Places in Each Group	41	35	6	2	3	7	6	1
Percent of Population in Each Group	9.96	16.58	5.41	2.13	4.68	15.45	31.72	14.07

SOURCE: Adapted from (19).

Table 16. Percent of Establishments in 1967.

Sales Category	2500-5000	5-10,000	10-15,000	15-20,000	20-25,000	25-50,000	50-100,000	>100,000
				Illinois				
				Population				
1. Lumber, Building Materials, Hardware, Farm Machinery	14.32	15.04	6.88	6.40	4.19	12.17	11.72	29.30
2. General Merchandise	9.92	12.32	6.79	7.10	4.43	11.98	12.63	34.83
3. Food Stores	6.85	8.92	5.33	4.88	3.47	10.40	12.22	47.93
4. Auto Dealers	11.78	14.76	7.31	7.20	4.39	15.21	15.30	24.05
5. Gasoline Stations	10.03	13.39	7.40	7.08	4.63	14.02	14.03	29.03
6. Apparel, Accessories	6.12	8.81	5.17	5.51	3.61	12.13	12.66	45.99
7. Furniture Stores	8.06	10.58	6.09	5.87	4.49	14.74	15.33	34.85
8. Eating, Drinking Places	7.21	8.35	5.42	4.96	3.38	10.32	12.68	47.69
9. Drug Stores, Proprietary Stores	7.47	8.51	5.49	5.07	3.52	10.87	13.97	45.11
10. Other Retail Stores	7.64	9.35	5.97	5.76	3.87	12.41	13.09	41.90
11. Nonstore Retailers	6.28	10.01	6.72	6.41	5.64	14.43	14.92	35.58
Total Establishments	8.09	10.14	6.81	5.73	3.94	12.08	13.29	40.72
Number of Places in Each Group	114	90	42	28	18	30	17	3
Percent of Population in Each Group	5.07	7.92	6.18	5.88	4.84	12.37	13.29	44.46
				Iowa				
1. Lumber, Building Materials, Hardware, Farm Machinery	28.18	30.46	3.46	3.24	1.18	12.66	11.41	9.42
2. General Merchandise	19.70	29.99	2.92	4.32	1.52	15.50	13.72	12.33
3. Food Stores	15.26	18.73	2.83	4.62	2.14	17.80	22.49	16.13
4. Auto Dealers	19.44	24.16	4.63	3.54	1.60	17.85	15.49	13.30
5. Gasoline Stations	16.73	22.94	3.08	4.32	1.41	16.13	17.84	17.54
6. Apparel, Accessories	18.63	26.91	3.31	4.10	1.50	17.68	14.44	13.42
7. Furniture Stores	16.79	24.18	3.11	4.45	1.68	18.89	15.11	15.79
8. Eating, Drinking Places	14.64	19.85	2.79	3.55	1.57	17.78	21.62	18.19
9. Drug Stores, Proprietary Stores	20.32	21.54	3.50	3.85	1.23	14.36	18.56	16.64
10. Other Retail Stores	16.73	25.44	3.48	3.98	1.32	16.84	18.25	13.97
11. Nonstore Retailers	14.88	18.92	4.59	4.59	0.73	15.24	20.94	20.11
Total	17.38	23.43	3.32	4.01	1.48	16.76	18.08	15.56
Number of Places in Each Group	42	35	4	5	1	9	5	2
Percent of Population in Each Group	9.96	16.24	3.27	5.28	1.44	18.94	24.65	20.22

SOURCE: Adapted from (20).

Table 17. Variables Used in Regression Analysis.

Variable Number [1]	Variable Description
(1)	Distance to the nearest town over 50,000
(2)	Distance to the nearest town over 25,000
(3)	Distance to the nearest larger town
(4)	Population
(5)	Gross retail sales
(6)	Square of variable (1)
(7)	Square of variable (2)
(8)	Square of variable (3)
(9)	Square of variable (4)
(10)	Logarithm of variable (1)
(11)	Logarithm of variable (2)
(12)	Logarithm of variable (3)
(13)	Logarithm of variable (4)
(14)	Logarithm of variable (5)
(15)	Per-Capita gross retail sales
(16)	Relative Retail Sales Index [2]
(17)	1 if the year of observation is 1958 0 otherwise
(18)	1 if the year of observation is 1963 0 otherwise
(19)	1 if the year of observation is 1967 0 otherwise

[1] These numbers are the variable numbers used in the correlation matrices in the following Appendix Tables 18 through 23.

[2] The method for calculating this index is given in Chapter I under "The Index of Centrality."

Table 18. Correlation matrix of variables for Illinois towns of 2,500 persons or more.

Sample Size = 968 Correlation Matrix	1	2	3	4	5	6	7	8	9
1	1.00000								
2	0.88012	1.00000							
3	0.11327	0.14213	1.00000						
4	-0.07818	-0.06252	0.00364	1.00000					
5	-0.08071	-0.06112	0.01398	0.99268	1.00000				
6	0.93793	0.85724	0.13112	-0.04968	-0.05045	1.00000			
7	0.85199	0.93270	0.11935	-0.04678	-0.04612	0.92925	1.00000		
8	-0.04502	-0.01839	0.86137	0.01527	0.01933	-0.00724	-0.01475	1.00000	
9	-0.05351	-0.04358	-0.03074	0.99668	0.98574	-0.03440	-0.03304	-0.00940	1.00000
10	0.71912	0.53761	-0.16621	-0.16731	-0.17891	0.52525	0.45060	-0.22273	-0.11868
11	0.54219	0.72906	0.08693	-0.05554	-0.05244	0.45594	0.52741	0.00251	-0.03107
12	0.35200	0.35857	0.62346	-0.14403	-0.13588	0.28001	0.27543	0.31342	-0.16158
13	-0.33031	-0.30864	0.27578	0.45628	0.46634	-0.20790	-0.19910	0.20384	0.39336
14	-0.15650	-0.11745	0.27215	0.33414	0.35610	-0.07519	-0.06063	0.16469	0.28593
15	0.13087	0.16694	0.09911	-0.00901	0.02052	0.10425	0.11867	0.00660	-0.01190
16	-0.09593	-0.13050	-0.32192	-0.13122	-0.14470	-0.08305	-0.09439	-0.15314	-0.09607
17	0.0	0.0	0.0	-0.00129	-0.00847	0.0	0.0	0.0	0.00093
18	0.0	0.0	0.0	0.00192	0.00194	0.0	0.0	0.0	-0.00047
19	0.0	0.0	0.0	0.00399	0.02429	0.0	0.0	0.0	-0.00194
	10	11	12	13	14	15		17	18
10	1.00000								
11	0.34073	1.00000							
12	0.20948	0.26441	1.00000						
13	-0.55008	-0.45308	0.03693	1.00000					
14	-0.36215	-0.22670	0.16057	0.72257	1.00000				
15	0.08810	0.17395	0.21439	-0.01784	0.40831	1.00000			
16	0.10343	-0.00960	-0.36525	-0.47694	-0.57813	-0.31470	1.00000		
17	0.0	0.0	0.0	-0.02177	-0.04708	-0.10216	0.00537	1.00000	
18	0.0	0.0	0.0	0.03579	0.04250	0.02320	-0.01349	-0.33333	1.00000
19	0.0	0.0	0.0	0.07125	0.14515	0.29221	0.02508	-0.33333	-0.33333
	19								
19	1.00000								

Table 19. Correlation matrix of variables for Illinois towns of 2,500 persons or more but less than 25,000.

Sample Size = 808 Correlation Matrix	1	2	3	4	5	6	7	8	9
1	1.00000								
2	0.92628	1.00000							
3	0.32400	0.36063	1.00000						
4	-0.21860	-0.23509	0.06562	1.00000					
5	-0.04666	-0.02823	0.15639	0.68764	1.00000				
6	0.94251	0.89418	0.26650	-0.15018	-0.02220	1.00000			
7	0.88361	0.93657	0.28853	-0.13816	-0.00169	0.95352	1.00000		
8	0.03383	0.06133	0.78949	0.07030	0.06457	0.03719	0.04877	1.00000	
9	-0.21489	-0.23700	0.06137	0.96812	0.66606	-0.15732	-0.15022	0.05853	1.00000
10	0.77176	0.67293	0.20907	-0.26456	-0.07145	0.59482	0.55018	-0.08217	-0.25169
11	0.62644	0.73419	0.31336	-0.46857	-0.14597	0.51890	0.54286	0.06349	-0.48050
12	0.46036	0.46835	0.62948	-0.10909	0.05714	0.34000	0.34718	0.23865	-0.07315
13	-0.20811	-0.21433	0.06136	0.95762	0.65980	-0.12858	-0.10829	0.07395	0.85957
14	0.02287	0.04135	0.15079	0.49868	0.73586	0.04459	0.06505	0.05718	0.45608
15	0.16694	0.19906	0.12622	-0.09111	0.57141	0.12606	0.13661	0.00194	-0.07779
16	-0.26204	-0.28498	-0.26685	-0.27269	-0.42299	-0.18575	-0.19826	-0.06005	-0.25727
17	-0.02656	-0.02820	0.06230	-0.01532	-0.09135	-0.01464	-0.01579	0.06983	-0.01732
18	0.01623	0.01746	-0.02087	0.03650	0.05350	0.00989	0.01026	-0.02316	0.03565
19	0.03073	0.03498	-0.01458	0.04934	0.23124	0.02000	0.02044	-0.02129	0.04369

	10	11	12	13	14	15	16	17	18
10	1.00000								
11	0.51655	1.00000							
12	0.53795	0.46134	1.00000						
13	-0.26333	-0.42654	-0.13904	1.00000					
14	-0.00189	-0.07386	0.10798	0.51294	1.00000				
15	0.19528	0.24873	0.22157	-0.09929	0.49506	1.00000			
16	-0.24121	-0.22021	-0.33226	-0.27243	-0.47215	-0.33661	1.00000		
17	-0.09073	-0.05003	0.01466	-0.01355	-0.05281	-0.08936	0.02225	1.00000	
18	0.04389	0.03244	-0.00650	0.03668	0.04421	0.03836	-0.02139	-0.33219	1.00000
19	0.05716	0.07670	-0.00235	0.05328	0.17009	0.26945	0.05296	-0.32552	-0.31807

	19
19	1.00000

Table 20. Correlation matrix of variables for Illinois towns of 2,500 persons or more but less than 10,000.

Sample Size = 556 Correlation Matrix	1	2	3	4	5	6	7	8	9
1	1.00000								
2	0.92670	1.00000							
3	0.43836	0.46383	1.00000						
4	-0.01778	0.02240	0.05654	1.00000					
5	0.15022	0.18502	0.21486	0.42068	1.00000				
6	0.94834	0.89892	0.37796	0.05748	0.14627	1.00000			
7	0.88863	0.94468	0.40528	0.10678	0.17688	0.95203	1.00000		
8	0.19943	0.23116	0.83081	0.08209	0.11220	0.20102	0.22715	1.00000	
9	-0.00630	0.03011	0.05784	0.98796	0.40932	0.06243	0.10789	0.08380	1.00000
10	0.77432	0.68501	0.38766	-0.11834	0.15911	0.60655	0.56237	0.06617	-0.10729
11	0.69312	0.78590	0.40552	-0.14111	0.15906	0.58461	0.61330	0.16882	-0.13196
12	4.45108	0.45574	0.75360	-0.13207	0.21861	0.33547	0.34662	0.43700	-0.13661
13	-0.03230	0.01025	0.05354	0.98627	0.42046	0.04678	0.09850	0.07909	0.94947
14	0.23890	0.27894	0.28492	0.41310	0.78805	0.21413	0.24453	0.12040	0.39920
15	0.16079	0.17993	0.19376	-0.07232	0.84013	0.11655	0.12183	0.05527	-0.07344
16	-0.30931	-0.34161	-0.31628	-0.14321	-0.41320	-0.21679	-0.23531	-0.12304	-0.13250
17	-0.04869	-0.04341	0.05213	0.00839	-0.04509	-0.03400	-0.02933	0.08025	0.01271
18	0.04453	0.04543	0.00702	0.02043	0.04693	0.03732	0.0 644	-0.01222	0.01650
19	0.06647	0.06111	0.01350	0.03653	0.23330	0.05348	0.04673	-0.01794	0.03289

	10	11	12	13	14	15	16	17	18
10	1.00000								
11	0.60969	1.00000							
12	0.62700	0.51180	1.00000						
13	-0.12862	-0.14956	-0.12579	1.00000					
14	0.25421	0.25883	0.33380	0.41740	1.00000				
15	0.22359	0.24547	0.29430	-0.07007	0.68631	1.00000			
16	-0.34991	-0.38246	-0.38034	-0.15234	-0.64965	-0.38677	1.00000		
17	-0.10760	-0.09531	0.00624	0.00443	-0.06504	-0.06008	0.01572	1.00000	
18	0.05318	0.07110	0.02316	0.02407	0.07775	0.04726	-0.04730	-0.32987	1.00000
19	0.08288	0.08755	0.04958	0.04049	0.23704	0.25457	0.05093	-0.32002	-0.30203

	19
19	1.00000

Table 21. Correlation matrix of variables for Iowa towns of 2,500 persons or more.

Correlation Matrix	1	2	3	4	5	6	7	8	9
1	1.00000								
2	0.51431	1.00000							
3	-0.03161	-0.14766	1.00000						
4	-0.32580	-0.20116	0.34572	1.00000					
5	-0.29086	-0.16293	0.35871	0.97683	1.00000				
6	0.95261	0.52938	-0.03298	-0.24367	-0.21716	1.00000			
7	0.57983	0.94913	-0.11710	-0.19808	-0.16734	0.62223	1.00000		
8	-0.12918	-0.16765	0.90439	0.41876	0.41585	-0.09232	-0.13011	1.00000	
9	-0.21899	-0.06467	0.12568	0.90958	0.91362	-0.15028	-0.08753	0.21494	1.00000
10	0.81799	0.40826	-0.06582	-0.48084	-0.43483	0.64054	0.41645	-0.22244	-0.35562
11	0.28086	0.82324	-0.11386	-0.17296	-0.12756	0.27898	0.64595	-0.12978	-0.01305
12	0.16174	0.03883	0.58206	-0.23241	-0.19074	0.07205	-0.01267	0.33127	-0.28431
13	-0.36283	-0.34691	0.42077	0.83262	0.78653	-0.31402	-0.32872	0.43652	0.57472
14	-0.30229	-0.27092	0.48368	0.81655	0.81464	-0.26691	-0.25490	0.45967	0.58565
15	0.21366	0.26783	0.00526	-0.27946	-0.16094	0.17646	0.25823	-0.07992	-0.13993
16	0.19331	0.16017	-0.25778	-0.35692	-0.33688	0.16808	0.14562	-0.20170	-0.21246
17	0.0	0.0	0.0	-0.00616	-0.04222	0.0	0.0	0.0	-0.00247
18	0.0	0.0	0.0	0.00943	0.00299	0.0	0.0	0.0	0.00728
19	0.0	0.0	0.0	0.01928	0.10905	0.0	0.0	0.0	0.01125

	10	11	12	13	14	15	16	17	18
10	1.00000								
11	0.25594	1.00000							
12	0.32849	0.16752	1.00000						
13	-0.44862	-0.36371	-0.15231	1.00000					
14	-0.37270	-0.29771	-0.07839	0.93292	1.00000				
15	0.25302	0.25008	0.19808	-0.44979	-0.11273	1.00000			
16	0.18236	0.15424	0.00911	-0.47956	-0.50041	0.18143	1.00000		
17	0.0	0.0	0.0	-0.00926	-0.08358	-0.21485	-0.09081	1.00000	
18	0.0	0.0	0.0	0.01496	0.02498	0.00283	-0.05370	-0.33333	1.00000
19	0.0	0.0	0.0	0.02939	0.19092	0.45900	0.19597	-0.33333	-0.33333

	19
19	1.00000

Table 22. Correlation matrix of variables for Iowa towns of 2,500 but less than 25,000.

Correlation Matrix	1	2	3	4	5	6	7	8	9
1	1.00000								
2	0.47363	1.00000							
3	0.19875	-0.07941	1.00000						
4	-0.15898	-0.25764	0.10276	1.00000					
5	-0.04149	-0.16386	0.35081	0.79327	1.00000				
6	0.95856	0.50418	0.14527	-0.18566	-0.09305	1.00000			
7	0.55134	0.95323	-0.04511	-0.26061	-0.16662	0.60086	1.00000		
8	0.16708	-0.11109	0.94786	0.10203	0.30198	0.12628	-0.06567	1.00000	
9	-0.17943	-0.23450	0.05354	0.96060	0.73664	-0.18449	-0.22735	0.05136	1.00000
10	0.81132	0.35236	0.26130	-0.08627	0.06937	0.65013	0.38057	0.19983	-0.13029
11	0.20424	0.81819	-0.15165	-0.25023	-0.19190	0.22813	0.65046	-0.20011	-0.23377
12	0.02917	-0.15442	0.74844	0.08746	0.29445	-0.03512	-0.18905	0.57557	0.03971
13	-0.12805	-0.26627	0.16736	0.94643	0.79027	-0.17428	-0.28343	0.16302	0.82518
14	-0.02045	-0.13780	0.37853	0.71201	0.94109	-0.08969	-0.14889	0.31027	0.61481
15	0.11628	0.18489	0.23419	-0.40460	0.15076	0.10070	0.19521	0.16785	-0.36099
16	0.04839	0.04797	-0.21720	-0.24157	-0.26480	0.05880	0.05380	-0.13235	-0.20882
17	-0.00241	0.00118	-0.00207	-0.01228	-0.14150	-0.00154	-0.00045	-0.00107	-0.01394
18	-0.00241	0.00118	-0.00207	0.03484	0.03451	-0.00154	-0.00045	-0.00107	0.03652
19	0.01587	0.00596	0.00026	0.00075	0.29133	0.01085	0.00761	-0.00053	-0.01364
	10	11	12	13	14	15	16	17	18
10	1.00000								
11	0.15938	1.00000							
12	0.14925	-0.11625	1.00000						
13	-0.03407	-0.25569	0.16078	1.00000					
14	0.11684	-0.16785	0.35309	0.76592	1.00000				
15	0.12948	0.13076	0.21116	-0.40913	0.24391	1.00000			
16	-0.03840	-0.00171	-0.24052	-0.26849	-0.33055	0.05294	1.00000		
17	-0.00470	0.00539	-0.00218	-0.01022	-0.14125	-0.22486	-0.09901	1.00000	
18	-0.00470	0.00539	-0.00218	0.03198	0.05452	0.01006	-0.06484	-0.33476	1.00000
19	0.02161	0.00179	0.00157	0.01354	0.29491	0.47979	0.24350	-0.32904	-0.32904
	19								
19	1.00000								

Table 23. Correlation matrix of variables for Iowa towns of 2,500 or more but less than 10,000.

Correlation Matrix	1	2	3	4	5	6	7	8	9
1	1.00000								
2	0.47611	1.00000							
3	0.18948	-0.09018	1.00000						
4	0.00990	-0.14716	0.33395	1.00000					
5	0.10675	-0.03847	0.49011	0.71539	1.00000				
6	0.96220	0.50024	0.13295	-0.03343	0.04428	1.00000			
7	0.55095	0.95584	-0.05678	-0.15980	-0.04087	0.59244	1.00000		
8	0.15888	-0.12357	0.95293	0.32265	0.43966	0.11406	-0.07725	1.00000	
9	0.01314	-0.13452	0.33446	0.98796	0.71359	-0.02664	-0.14041	0.33364	1.00000
10	0.81847	0.36859	0.24720	0.07350	0.19016	0.66945	0.39772	0.19435	0.06782
11	0.18824	0.82585	-0.17688	-0.21313	-0.12690	0.21919	0.66721	-0.22874	-0.21158
12	0.00473	-0.16972	0.72425	0.27319	0.38984	-0.05785	-0.20939	0.55583	0.24933
13	-0.00027	-0.16281	0.32790	0.98718	0.70144	-0.04708	-0.18403	0.30736	0.95128
14	0.08334	-0.03022	0.46751	0.68205	0.95212	0.01253	-0.04048	0.38771	0.66426
15	0.05908	0.12072	0.20692	-0.19883	0.50280	0.03229	0.13052	0.14660	-0.18175
16	0.02345	0.01128	-0.20445	-0.26266	-0.21935	0.03865	0.02373	-0.12321	-0.24567
17	-0.00110	-0.00521	-0.00153	-0.02220	-0.19270	0.00192	-0.00102	-0.00026	-0.02443
18	0.00423	0.00736	0.01345	0.02492	0.04189	0.00302	0.00496	0.00706	0.02653
19	0.00423	0.00736	0.01345	0.05386	0.40729	0.00302	0.00496	0.00706	0.06083

Correlation Matrix	10	11	12	13	14	15	16	17	18
10	1.00000								
11	0.14097	1.00000							
12	0.11402	-0.13227	1.00000						
13	0.07306	-0.21418	0.29774	1.00000					
14	0.20336	-0.10790	0.42143	0.68407	1.00000				
15	0.09107	0.08027	0.18411	-0.20919	0.53321	1.00000			
16	-0.07733	-0.05062	-0.22825	-0.26480	-0.30291	0.02733	1.00000		
17	-0.01141	-0.01382	-0.00222	-0.01946	-0.17028	-0.25002	-0.10181	1.00000	
18	0.00980	0.01183	0.01401	0.02334	0.06433	0.03068	-0.08864	-0.33005	1.00000
19	0.00980	0.01183	0.01401	0.04711	0.36236	0.52485	0.25437	-0.33005	-0.33005

Correlation Matrix	19
19	1.00000

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